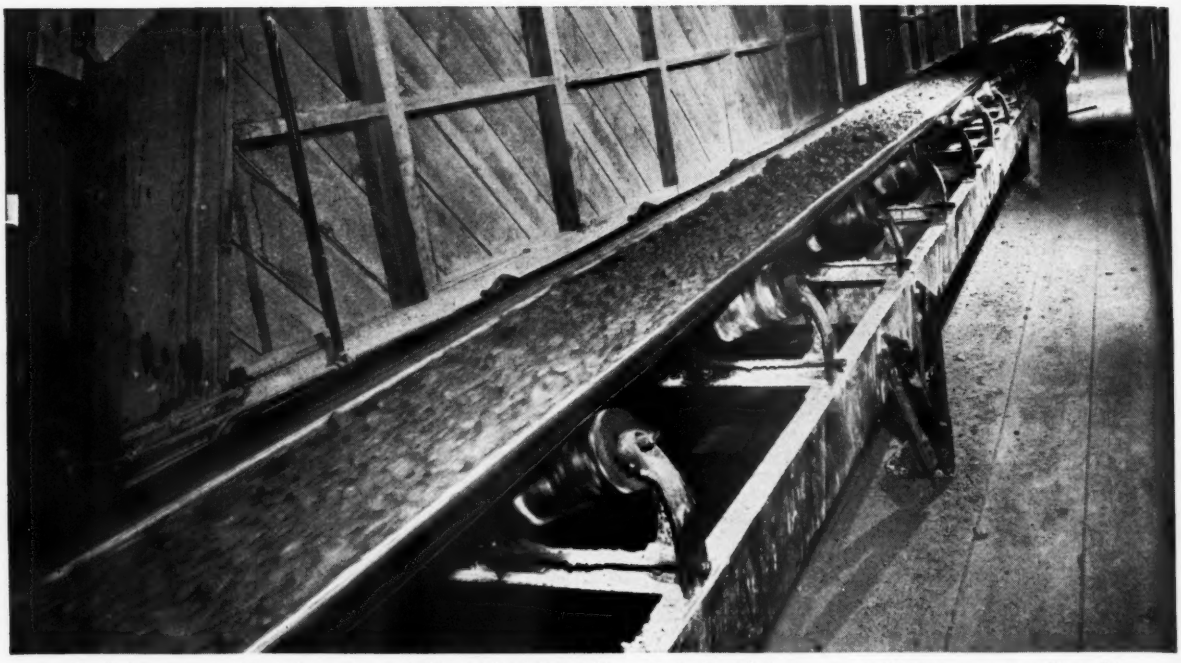
# Mining CONGRESS JOURNAL

AUGUST 1952

*Featuring* **Metal Mining Convention and Exposition**



Crushed and screened lead-zinc ore is carried by this Link-Belt 24-in. wide inclined belt conveyor to 3000-ton capacity mill ore bin.

# Why LINK-BELT belt conveyors are first choice in so many industries . . .

## Engineering experience plus quality components combine to cut handling costs

EFFICIENCY in moving materials makes the difference between profit and loss in many operations. That's why it's so important to make sure you get the *right* belt conveyor system for your needs.

And there's no surer way of meeting your specific operating requirements than by calling in Link-Belt. Our belt conveyor specialists can efficiently engineer the system and recommend the correct components from Link-Belt's complete line of idlers, trippers and terminal machinery. And Link-Belt can match your needs in associated equipment—other types of conveyors, feeders, elevators, car dumpers and shakers.

Equally important, with such a tremendous background in belt conveyor application, Link-Belt is in an ideal position to follow through on every detail of your job—from planning through erection, if desired. One source—one responsibility.

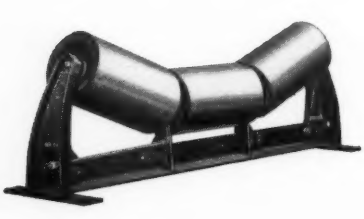
Link-Belt will gladly work with your engineers or consultants. There's a Link-Belt office in the principal city near you.

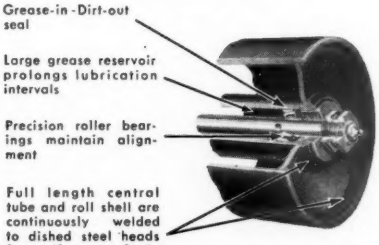
**LINK-BELT COMPANY:** Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, Duluth 2, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa), Sydney (Australia). Offices in Principal Cities. 12,720-F

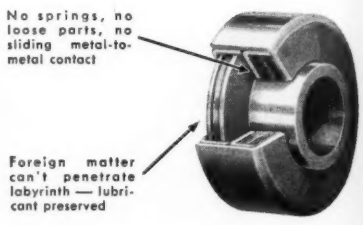
**LINK-BELT**

**BELT CONVEYOR EQUIPMENT**

## LINK-BELT Roller Bearing Idlers provide free-rolling, long life




Grease-in-Dirt-out seal
Large grease reservoir prolongs lubrication intervals
Precision roller bearings maintain alignment
Full length central tube and roll shell are continuously welded to dished steel heads for uniform, perfectly balanced strength

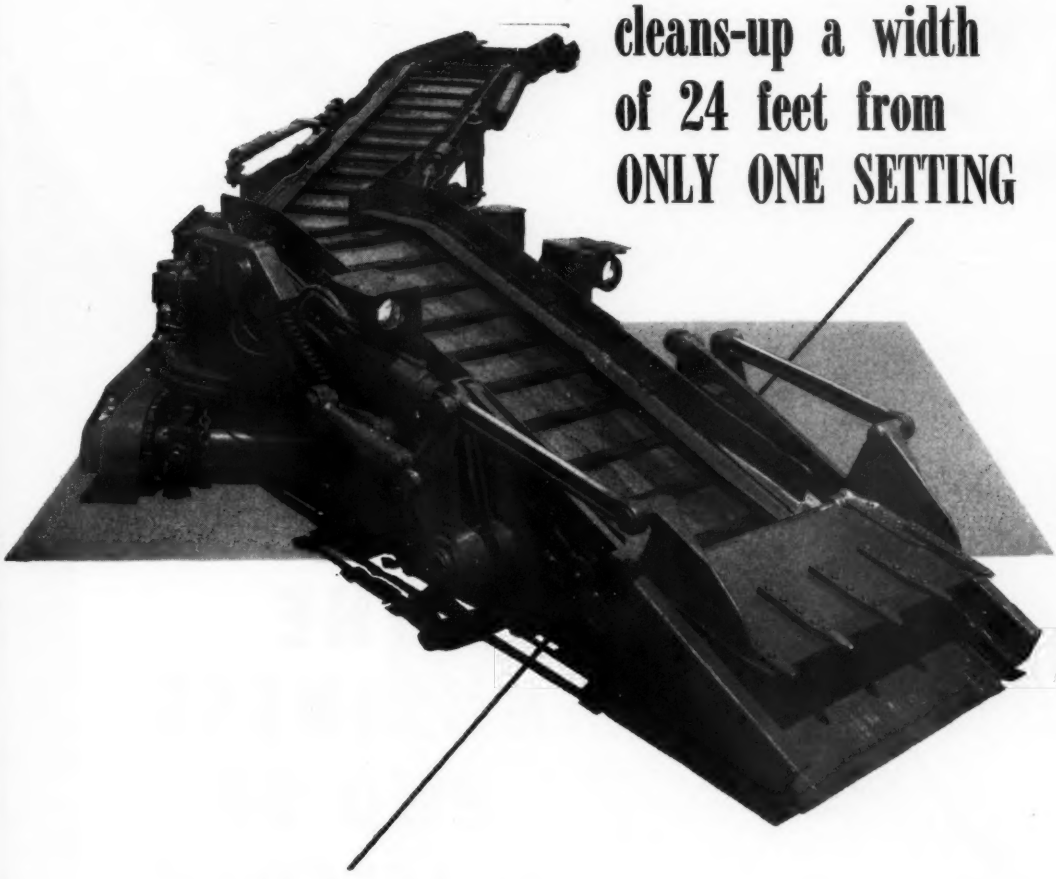

No springs, no loose parts, no sliding metal-to-metal contact
Foreign matter can't penetrate labyrinth — lubricant preserved

**Standard for industry—L-B "100" Idler** **Less lubrication and adjustment** **Grease-in-Dirt-out Seal**

**SEE OUR EXHIBIT — METAL MINING EXPOSITION — DENVER — SEPTEMBER 22-25**

# the NEW CRAWLER MOUNTED "AUTOMAT"

## cleans-up a width of 24 feet from ONLY ONE SETTING



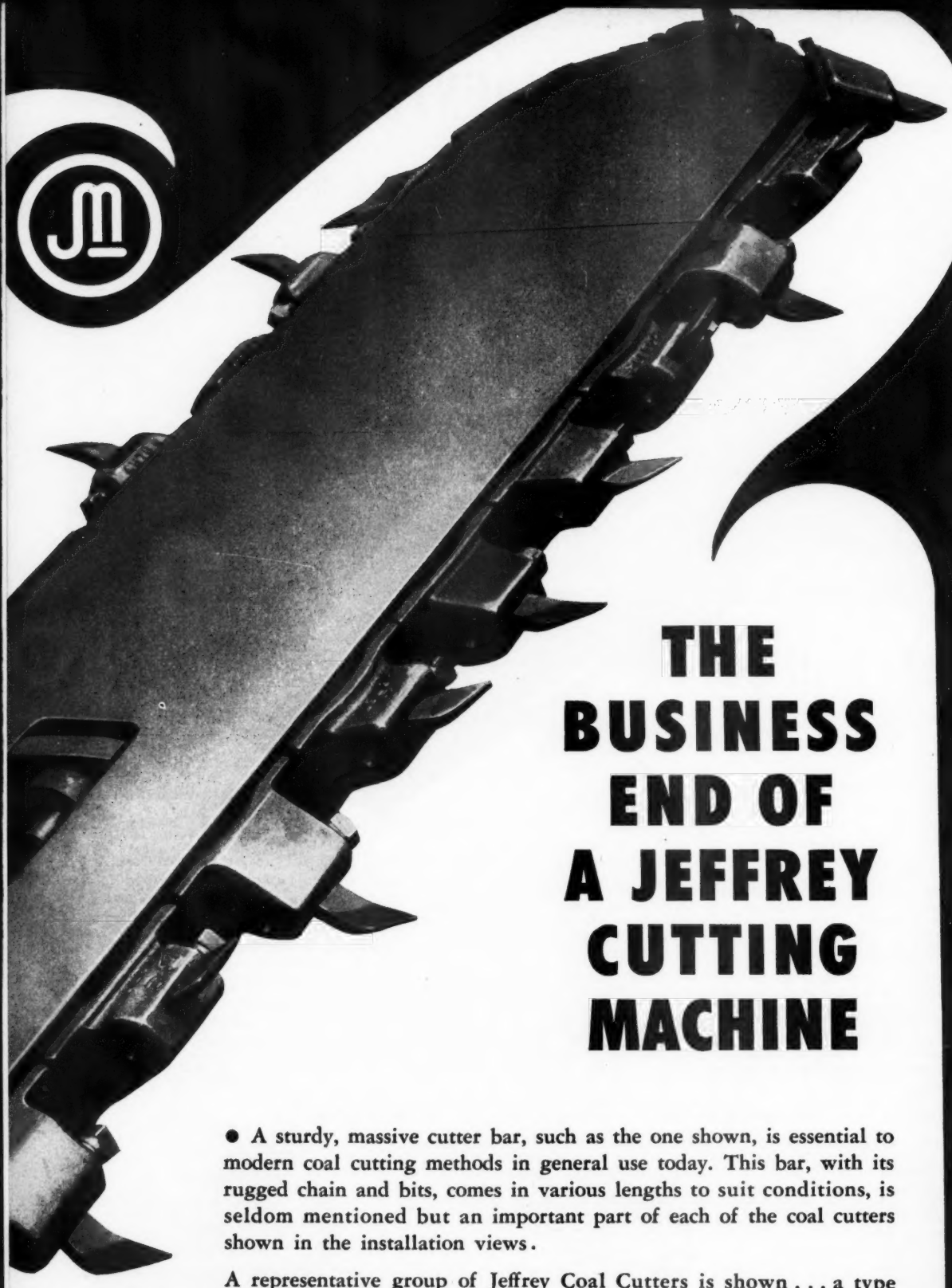
One of the important advantages of the Crawler Mounted Whaley "Automat" is that it cleans up a width of 24 feet from only one setting of the crawlers. This means the steering and the crawler mechanism are not excessively used . . . resulting in minimum disturbances of tender or soft bottom.

In addition to minimum operation of the simple and very efficient crawler mechanism, the "Automat" brings to off track loading all the advantages of the famous track mounted "Automat." 1—The true automatic shoveling mechanism actually shovels the coal or rock onto the conveyor. 2—Loads bigger cars in limited head room and loads them to capacity because of wide range of adjustments to suit any condition. 3—A single motor with a continuous rating of 24 H. P. is all the power required. 4—Because the loading action of the "Automat" is always in a vertical plane, there is no danger of any part of the machine side kicking . . . knocking out timbers or crushing workmen.

For track or off track loading, investigate the Whaley "Automat," well known by reputation for staying on the job day-in and day-out loading in all classes of material *at the lowest possible cost!* Folder No. 472 gives details and specifications on the Whaley "Automat" track mounted loaders. Folder No. 2015 gives the details and specifications on the Crawler Mounted Whaley "Automat" Loaders. Myers-Whaley Co., Knoxville, Tenn.

# MYERS-WHALEY COMPANY

**MECHANICAL LOADERS EXCLUSIVELY SINCE 1908**



# THE BUSINESS END OF A JEFFREY CUTTING MACHINE

● A sturdy, massive cutter bar, such as the one shown, is essential to modern coal cutting methods in general use today. This bar, with its rugged chain and bits, comes in various lengths to suit conditions, is seldom mentioned but an important part of each of the coal cutters shown in the installation views.

A representative group of Jeffrey Coal Cutters is shown . . . a type and size from a full line of SHORTWALL cutters to the new rubber-tired UNIVERSAL type. Consult a Jeffrey engineer for complete details of these machines and for suggestions as to the one best suited to your operation.

The Jeffrey 35-B Shortwall Coal Cutter (right) operating in a low vein mine. Can be equipped with Slack Handling Device for removing cuttings. There is a unit in our line of Shortwall machines to fit your need exactly.

Jeffrey Universal Coal Cutters are very versatile. The 29-U track-mounted Universal cutter is shown (bottom) cutting. It is for mines where mine cars haul coal from the face. At bottom, right, is the Jeffrey 70-URB Universal Coal Cutter mounted on rubber tires. It is widely used for trackless mine operation in conjunction with Shuttle Cars.

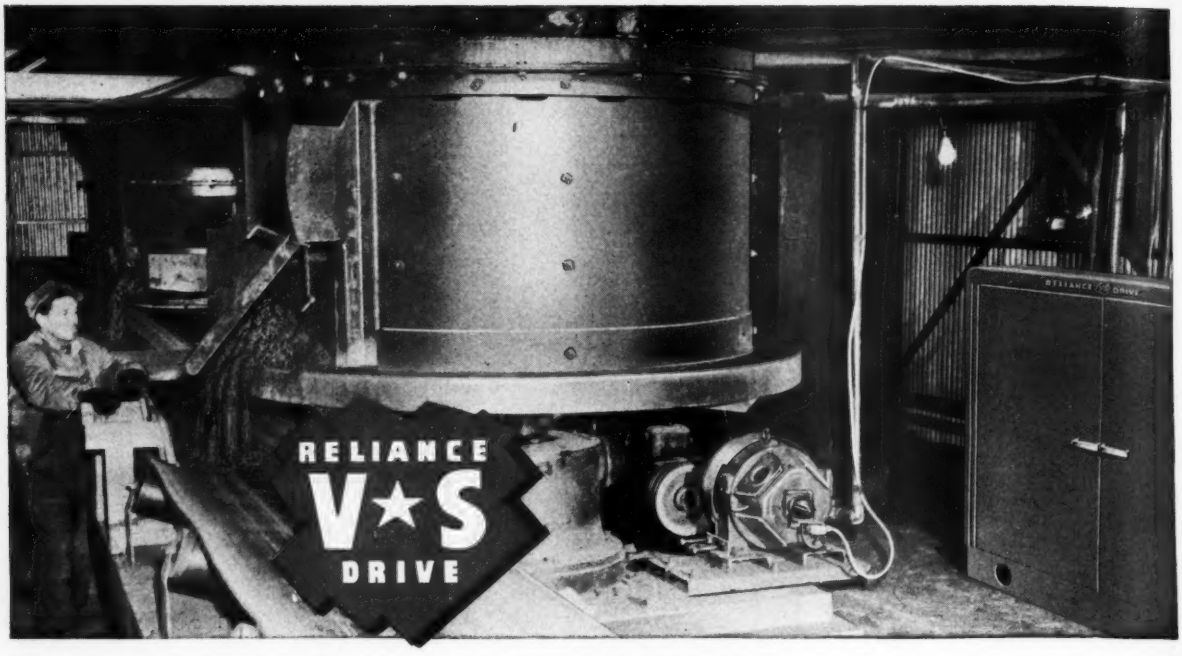
Other equipment for both below and top ground operation:

| | |
|---|---|
| Bucket Elevators | Feeders |
| Car Pullers | Idlers (belt) |
| Chains | Jigs |
| Conveyors | Loading Machines |
| Crushers | Locomotives |
| Drills | Magnetic Separators |
| Fans and Blowers | Pulverizers |
| Shuttle Cars | Screens |

Jeffrey has the facilities and machines to mechanize your workings completely including Continuous Mining Machines and Conveyors to take the coal away. Write.

# JEFFREY

1877 75 1952



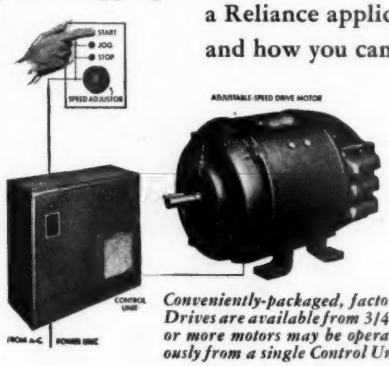

# BETTER CONTROL OF CONCENTRATES

## ...at lower cost—with Adjustable Speeds from A-c. Circuits

Behind the steadily increasing use of the versatile Reliance V★S Drive, introduced over 14 years ago, stands a simple explanation: *It is one of the surest ways to increase production and lower operating costs!*

Reliance V★S, the original *Packaged, All-electric, Adjustable-speed Drive,* operates direct from your plant's A-c. circuit—with control at the machine or from any remote location. In addition to the basic functions of quick, smooth starting and stopping and stepless speed changing over an infinite range, it offers whatever flexibility is needed to secure maximum output at minimum cost. In such processing as the sintering of ores, for example, this means the accurate control of feed-speeds and proportioning from a central operator's station.

For further information it will pay you to have, write today for Bulletins D-2311 and D-2101. Or, a phone call to the nearest Reliance office will bring a Reliance application engineer to show you where and how you can use V★S most profitably.




*Conveniently-packaged, factory-wired V★S Drives are available from 3/4 to 300 hp. Two or more motors may be operated simultaneously from a single Control Unit.*

**RELIANCE ELECTRIC AND ENGINEERING CO.**

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*Opinions expressed by authors within these pages are their own, and do not necessarily represent those of the American Mining Congress*

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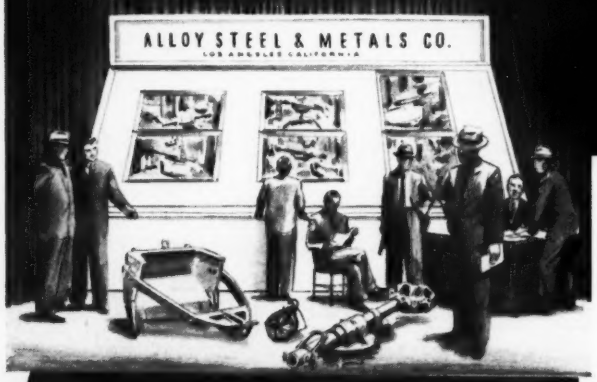
AMERICAN MINING CONGRESS

AMC

# See your Pacific Pals at the Show

BOOTH 709

AMERICAN MINING CONGRESS
DENVER, COLORADO
SEPTEMBER 22, 23, 24, 25




THE NEWEST THINGS IN MINING

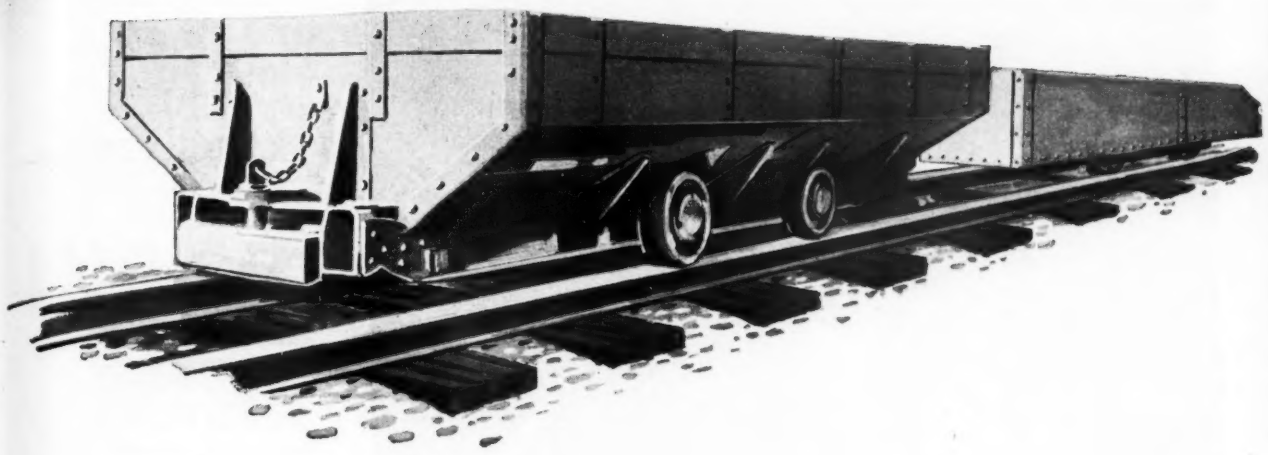
## ALLOY STEEL & METALS COMPANY

1848 East 55th Street
Los Angeles 58, California
MAILING ADDRESS:
Box 15323 Vernon Station
Los Angeles 58, California

In our display booth we will show action pictures of a Pacific "Slushmaster" Scraper making 90° turns with the help of the Pacific "Round-The-Corner" Sheave Block, and a Pacific Half-Shroud Sheave Block. The actual products will also be on display.

Operation of the "R-T-C" is hard to understand but easy to appreciate. Experience shows that this Pacific Team cuts the cost of mucking out a square-set round in half! The action pictures, taken at Bunker Hill And Sullivan Mining And Concentrating Co., Kellogg, Idaho, are blown up to 20"x24" size and illuminated from behind. Once you see them, any mystery about how the "R-T-C" works will be cleared right up. In addition, we will distribute a new Bulletin No. 232 which describes the operation in detail. See you at the show!

**BE SPECIFIC—ORDER PACIFIC**—Jaw Crushers, "Slushmaster" Scrapers, Sheave Blocks, "Round-The-Corner" Sheave Blocks, Sheave Anchors, Bit Knockers—ask for Catalog No. 215.



# 1 mine car does work of 2..!

*Actual production figures prove that one* A.C.F. *Drop Bottom Mine Car can give you the mining efficiency of 2 ordinary cars.* A sample of 100 important mines 'round the country shows that in a mechanized mine, you can get out the same tonnage with 53% fewer A.C.F. Drop Bottom Mine Cars!

You get an 87% tonnage *bonus* by using the same number of cars. The secret of this increased production is the elimination of delays at the dumping point. Temporary delays at the tipple or the mine face need not stop coal production. The fast automatic dumping of A.C.F. Drop Bottom Cars keeps storage hoppers filled to provide continuous operation of your preparation plant.

If you are interested in the story of greater efficiency with A.C.F. Drop Bottom Cars, get in touch with your A.C.F. Representative. American Car and Foundry Company, New York Chicago • St. Louis • Cleveland • Washington Philadelphia • San Francisco • Huntington, W. Va. • Berwick, Pa.

A.C.F. Drop Bottom Mine Cars cut hours off unloading time...resulting in a substantial production bonus.

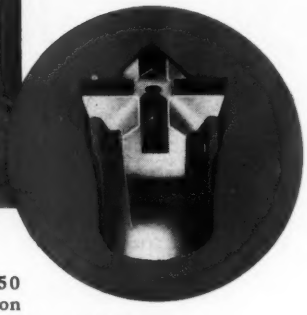
A.C.F.

*Drop Bottom* **MINE CARS**

*for Constant Haulage*

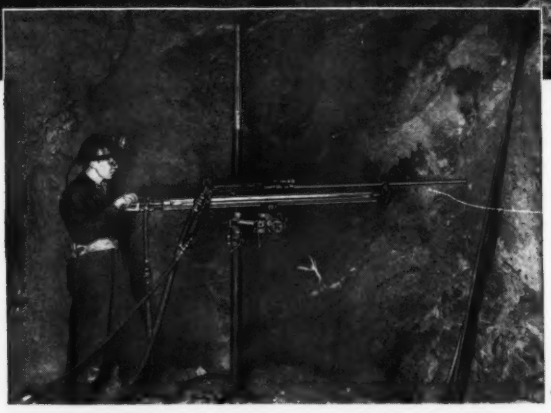
## UNIVERSAL JACKDRILL

The JR-38 combines important new features never before available in an air-feed-leg unit. Can be used as a stoper—a drifter—or a Jackhamer. Gives new speed and convenience in setting up, collaring, drilling and hole blowing. Available with 2′, 3′ or 4′ feed legs.



## CARSET JACKBITS

Pioneered by Ingersoll-Rand the Carset Jackbit drills faster, has negligible gauge wear, practically eliminates bit changes, saves manhours all along the line.



## DRIFTERS

Light-weight D-50 Drifter Combination saves time and labor in small headings and flat-hole stoping. Includes powerful D-50 Drifter, fast PF-3 power feed, aluminum shell, aluminum alloy arm and clamps and pneumatic column.

## SLUSHER HOISTS

I-R's complete line of highly efficient, low maintenance air or electric driven slusher and scraper units covers every requirement for underground or surface mining. The two-drum, air-powered unit shown above is used for scraping muck into a vertical raise approximately 220 ft from the face.

## CENTRIFUGAL PUMPS

I-R centrifugal pumps have proved their outstanding economy and dependability under the most severe conditions of mine service. Each of the four-stage, 500 hp units shown handle 800 gpm at 1700 ft head in a centralized drainage system for a group of copper mines.

*every step of the way*

# INGERSOLL-RAND SPEEDS MINERAL PRODUCTION

## ...with over 80 years of specialized experience in serving the metal mining field

During this time Ingersoll-Rand has developed and perfected an extensive line of specialized mining equipment. Our worldwide staff of field and factory engineers has acquired an unequalled background of experience in meeting and overcoming the countless production problems entailed in mining.

This wealth of experience, and this complete line of proven equipment, are at your service. Whatever the problem, your Ingersoll-Rand representative may be able to help you find the one *best solution*—be it equipment, application engineering or field service.

***DON'T MISS THE I-R EXHIBIT AT THE METAL MINING SHOW!***

September 22-25—City Auditorium, Denver, Colorado. Located to the left of the Main Entrance on entering the building, Booth 201

- ROCK DRILLS
- COMPRESSORS
- AIR TOOLS
- TURBO BLOWERS
- CONDENSERS
- CENTRIFUGAL PUMPS
- DIESEL AND GAS ENGINES

**Ingersoll-Rand**
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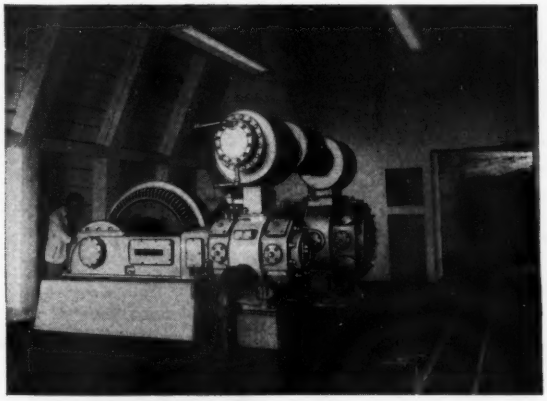


### AIR COMPRESSORS

I-R stationary and portable compressors are preferred the world over as a source for dependable, low cost air power in mining service. The 400 hp PRE unit shown above is located underground, 6000 ft from the portal.

### TURBO BLOWERS

I-R Turbo-Blowers have built an enviable performance record for long, trouble-free service in metal refining and smelting plants. The six units shown above, installed in a large copper converter plant, have a combined capacity of 157,000 cfm at 15 psi.

# The time to start is now

Illustrating shield partly expanded, after insertion in hole.

The sooner you get started on a roof-bolting program, the sooner you'll begin to enjoy the advantages: the greater safety, increased economy, and freedom from space-consuming timbers in addition to faster transportation and less material-handling, as well as wider mine openings, with improved ventilation.

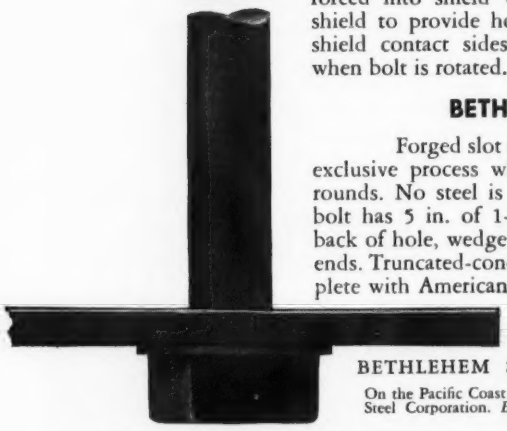
Bethlehem offers two types of roof bolts to mine operators. Each bolt comes in a variety of lengths, and can be used vertically or at an angle. Write for full particulars.

### BETHLEHEM SQUARE HEAD ROOF BOLT
(WITH EXPANSION SHIELD)

An assembly, consisting of unchamfered square-head rolled-thread ¾-in. bolt, plug, and expansion shield. Pressed ears on bolt shank support shield during anchoring. Plug is forced into shield when bolt is tightened, expanding the shield to provide holding-tension. Projections on leaves of shield contact sides of hole, prevent shield from turning when bolt is rotated.

### BETHLEHEM SLOTTED ROOF BOLT

Forged slot accommodates wedge. Slot is centered by exclusive process which forms the equivalent of two half-rounds. No steel is lost through burning. Opposite end of bolt has 5 in. of 1-in. rolled threads. When driven against back of hole, wedge is forced deep into slot, expanding bolt-ends. Truncated-cone point prevents damage to threads. Complete with American Standard Regular Square Nut.



BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

**BETHLEHEM'S EXHIBIT at the 1952 Mining Show, Denver, will feature the following products:**

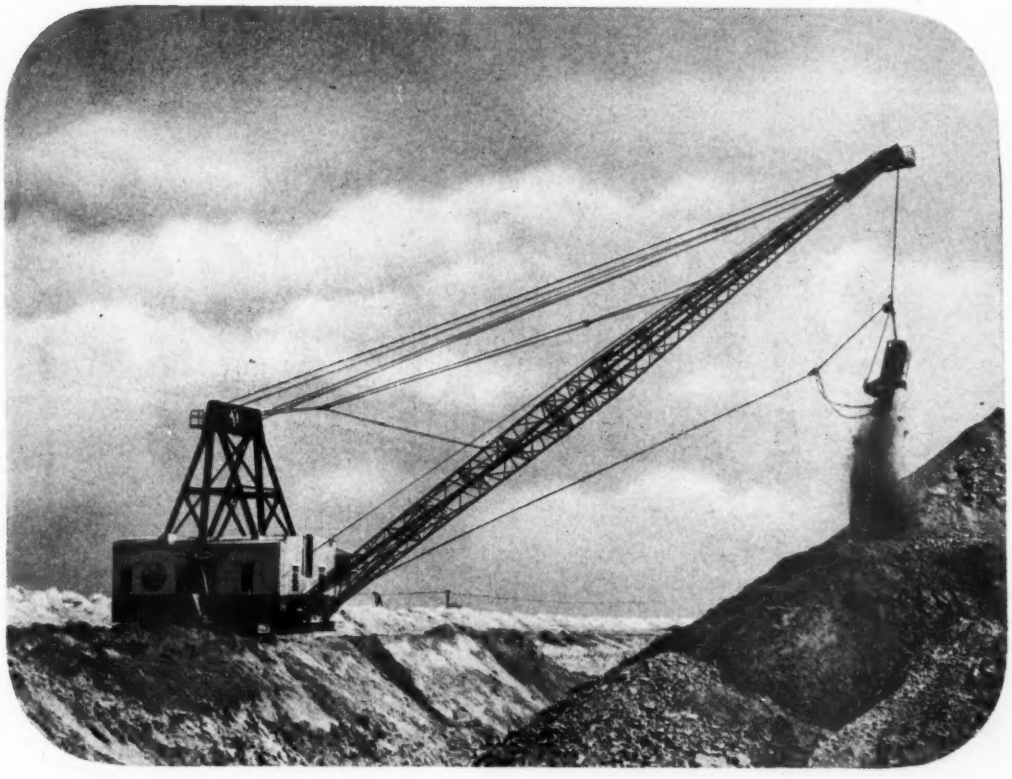
**Roof Bolts • Steel Ties • Ar-Moored Ties**
**Mine Frogs • Wire Rope • Wheels**

**Plan to visit us in Booth 1420, Auditorium Floor**

BETHLEHEM STEEL

# BETHLEHEM MINE ROOF BOLTS

# WIRE ROPE



## *This is the most economical rope we've ever made for mining*

ROEBLING is the best known name in wire rope. That's partly because we were the first wire rope maker in America. But more than that, we've always led in developing better wire and better rope for every purpose.

Today's Roebling Preformed "Blue Center" Steel Wire Rope is the miners' best choice for efficiency and long life. This rope has extra resistance to crushing and abrasion . . . takes rough going. It saves you time and cuts costs.

There's a Roebling wire rope for top service on any job. Call on your Roebling Field Man for his recommendations. John A. Roebling's Sons Company, Trenton 2, New Jersey.

**ROEBLING**

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# McCARTHY NEW COAL RECOVERY DRILL

36-INCH DIAMETER AUGERS,
24 FEET LONG

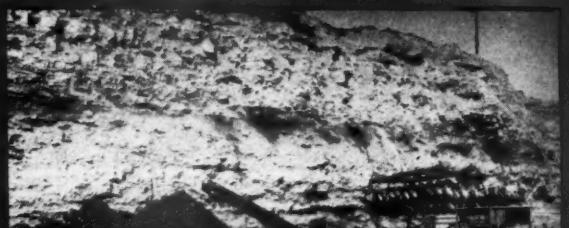
# BIG PROFITS

## Small Investment—Low Overhead . . .

• You trade rich coal deposits in unmined, abandoned, high-wall strip mines for money in the bank when you put the new McCarthy auger machine to work.

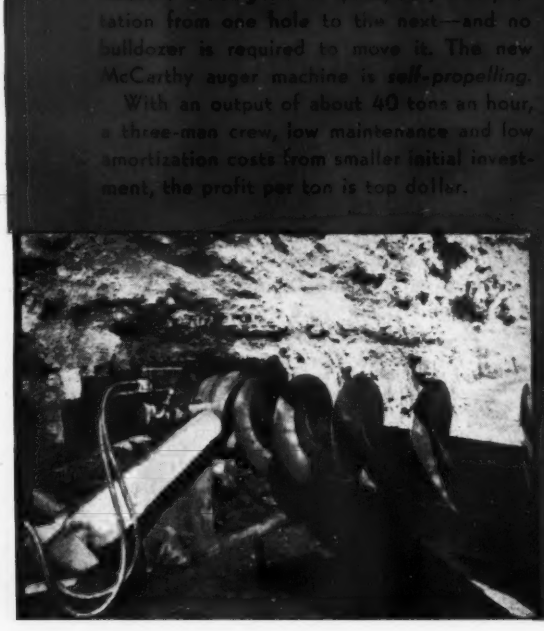
You gain many thousands of tons of coal in the course of a year because the McCarthy machine is designed for quick, easy transportation from one hole to the next—and no bulldozer is required to move it. The new McCarthy auger machine is *self-propelling*.

With an output of about 40 tons an hour, a three-man crew, low maintenance and low amortization costs from smaller initial investment, the profit per ton is top dollar.



### Field test near Cadiz, Ohio

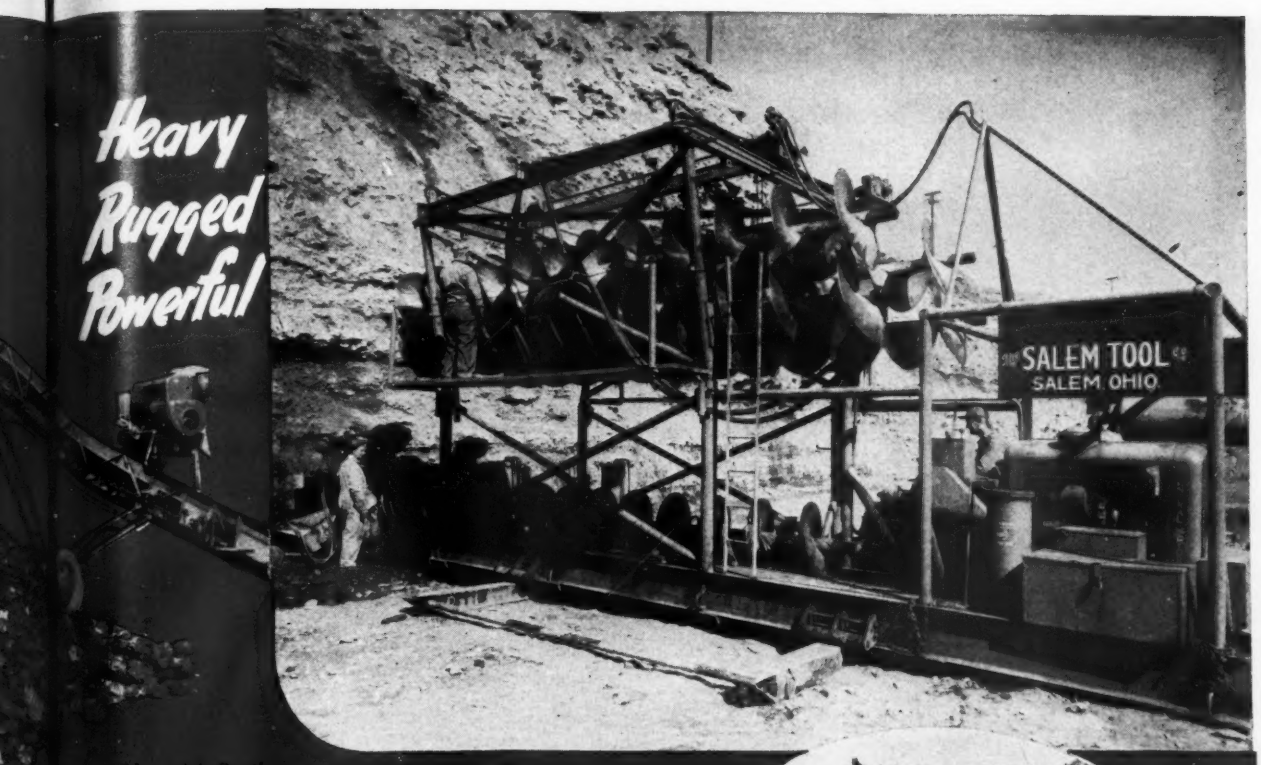
• Conveyor extension under auger cleanly picks up augered coal, and boosts it to 35-foot truck loading conveyor. For ease in portability of all equipment from one strip mine to the next, conveyors are detached from auger machine.



### Clean pickup by conveyor

• Mr. McCarthy, Engineering Field Representative, states: "In spite of a 2-inch hard parting about midway of the seam, cutting speeds averaged up to 3 feet per minute."

# Heavy Rugged Powerful




● New McCarthy coal auger [illegible] auger produces 250 to 300 tons per day. Drills 38-inch holes; 6½-inch carbide pilot head, tungsten-carbide barrel bits produce large run-of-mine coal.

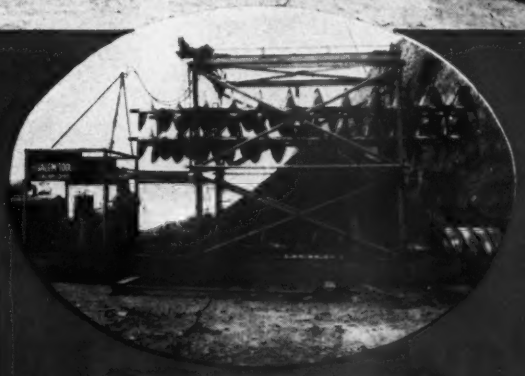
## DESIGNED WITH YOUR PROBLEMS IN MIND

Time lost in transportation . . . and on the job inflates overhead costs and skims cream from profits. As well as high output, The Salem Tool Company has built rapid maneuverability into the design of the new McCarthy drill. The entire auger carriage assembly is easily unbolted and disassembled into sections convenient to handle. Conveyors are moved by the drilling machine as it advances to successive holes. For highway travel conveyors are disconnected and the machine lifts itself to a height of 3 feet on its hydraulic jacks to allow truck tractor bed to roll under. Short 32-foot length and 8-foot width permit convenient and allowable highway movement.

In the strip mine, drilling capacity and profit per shift are high. A three-man crew maintains continuous drilling up to 170 feet (depending on number of augers used and horse power of engine). For high veins, double overlapping holes are drilled to get maximum recovery.

Finger-tip controls replace all painstaking manual labor. Augers are moved into drilling readiness in a few seconds. At the Cadiz mine initial drilling of holes to a depth of 120', retracting augers and moving itself to next hole averaged an hour and four minutes.

Rugged construction and sufficient weight brace the new McCarthy machine for the toughest drilling conditions. You can depend on McCarthy for peak performance that nets you BIG PROFITS.



## SPECIFICATIONS OF MODEL 12-36-24 RECOVERY DRILL

SIZE—37' long, 8' wide, 11' high. When crane frame and auger rack superstructure are removed, height is 13' for underpass clearance.

GROSS WEIGHT—Approximately 70 tons without conveyor and auger equipment.

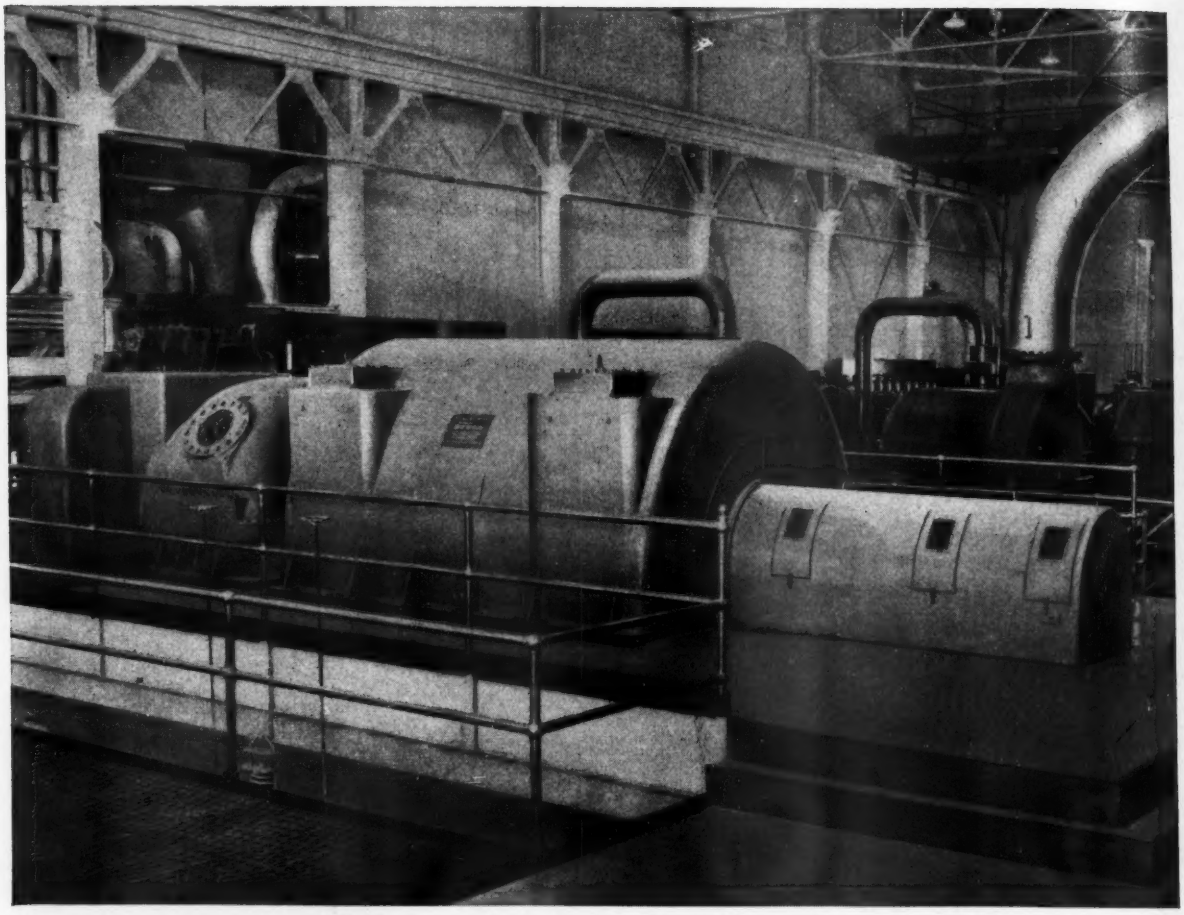
ENGINE—Diesel, gasoline or [illegible] motor.

Contact Salem Tool today for information and further specifications. At your request the Salem Tool representative will call at a time convenient to you.

THE SALEM TOOL CO.

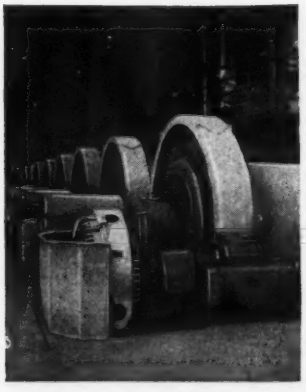
779 S. ELLSWORTH AVE. • SALEM, OHIO, U. S. A.

Salem Tool manufactures 3" to 54" diameter augers for blast holes or coal recovery.

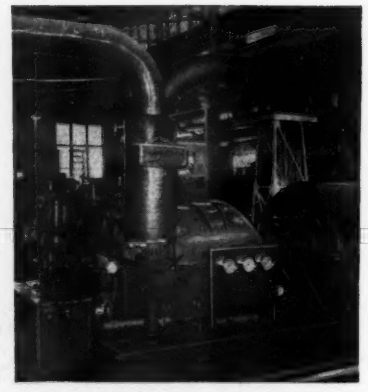


**1** **NEW G-E STEAM TURBINE-GENERATOR** generates high-voltage power for this copper company's concentrating and smelting plant. Rated at 10,000 kw, 3600 rpm, the single-stage unit replaces an older 6000-kw unit which generated at 480 volts. Like every G-E turbine-generator, it is custom-built from standard components to meet specific operating conditions.

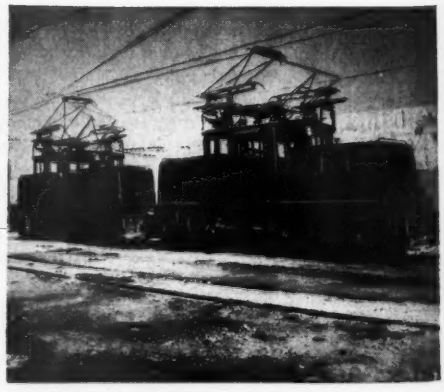
# Power system modernized for



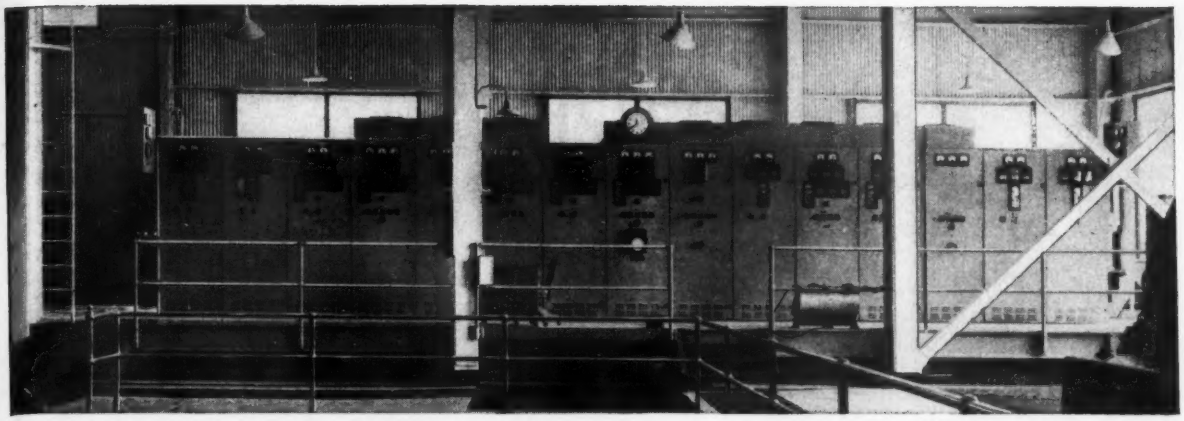
**POWER-FACTOR IMPROVEMENT** is provided by 28 200-hp synchronous motors driving plant's ball mills.



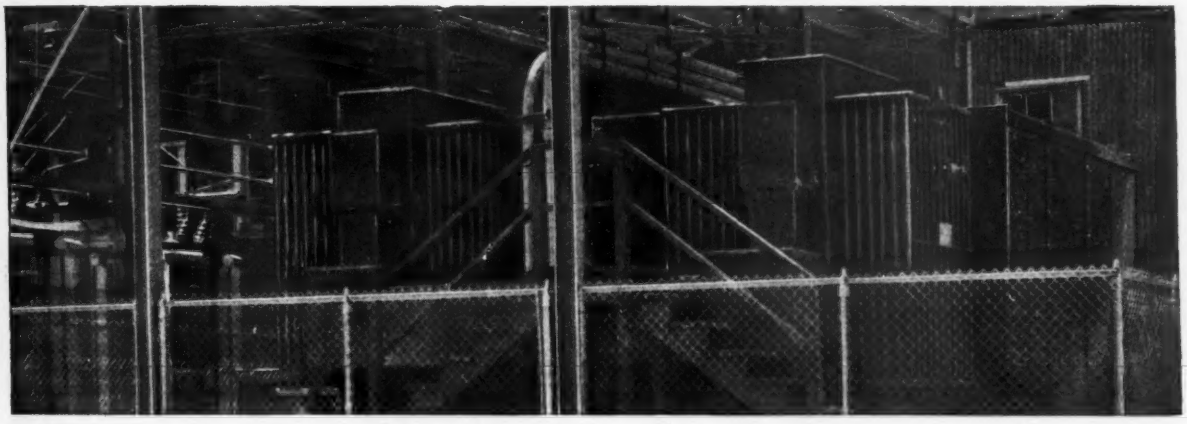
**MECHANICAL POWER** to drive two turboblowers is generated from process steam by 1915-hp G-E mechanical-drive turbines.



**LOW-COST HAULAGE** from the copper plant's open pit mine 15 miles away is provided by these two G-E 750-volt 85-ton electric locomotives.



**2** **NEW G-E METAL-CLAD SWITCHGEAR** distributes high-voltage power to load-center substations in electrical load areas. These co-ordinated units are shipped completely assembled and ready for installation. Their compact design saves floor space.



**3** **NEW G-E LOAD-CENTER SUBSTATIONS,** completely metal-enclosed, step down power from primary voltage to 480-v for use in the ball mill area. High voltage power distribution to load centers reduces voltage drop and cuts power losses.

# more efficient distribution

## Copper plant increases capacity by adding G-E turbine, switchgear and load-center substations to existing power system

As part of a continuing modernization program at its concentrating and smelting plant, a large copper company in the Southwest recently installed new General Electric high-voltage power generation and distribution equipment. With these new facilities, power is generated and distributed the modern, high-voltage way. Result: increased protection against shutdowns, lower power-distribution cost.

You, too, can benefit from the kind of G-E application engineering that went into this installation. Call your nearest G-E office and ask for a mining specialist. *General Electric Company, Schenectady 5, New York.* 660-25

**Engineered electric systems for the copper industry**

**GENERAL ELECTRIC**

Sinkers
Sinker Legs
Drifters
Stopers
Power Feeds

# VISIT Thor

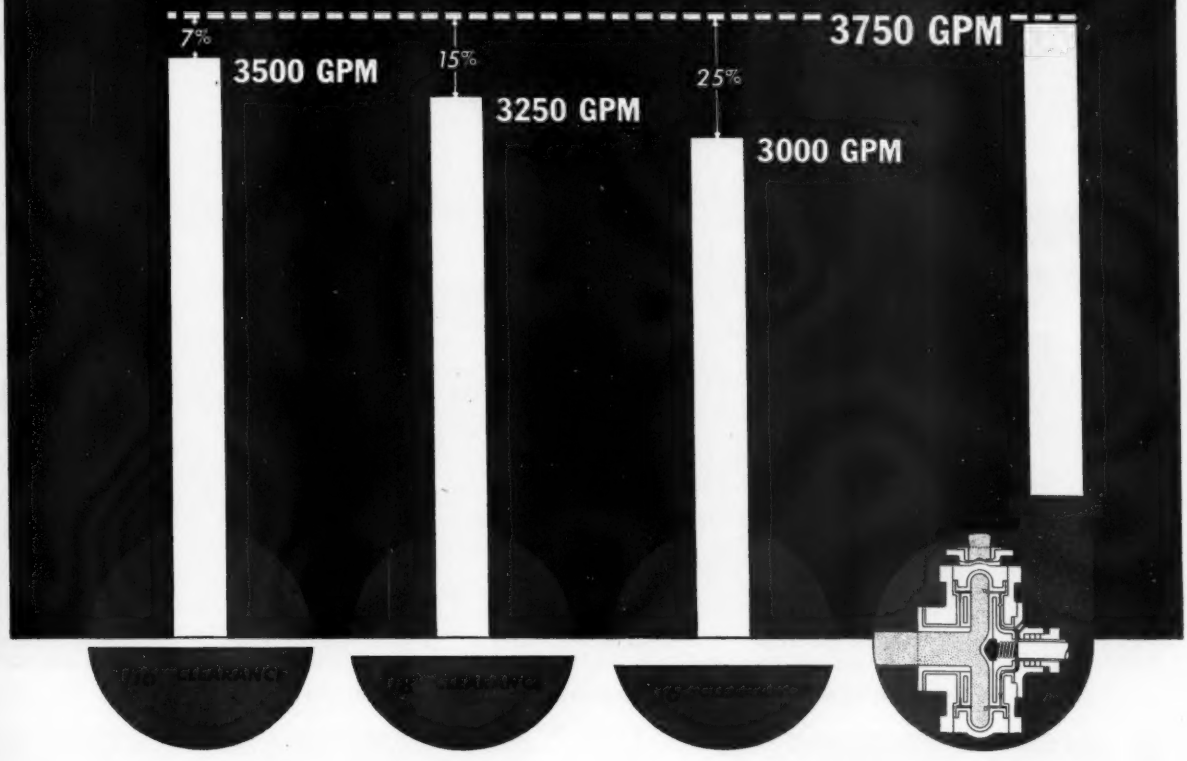
Jumbos
Paving
Breakers

**COMPLETE LINE OF AIR AND ELECTRIC TOOLS**

## DENVER MINING CONGRESS

# BOOTH NO. 406-410

# How Hydrosealing pays off

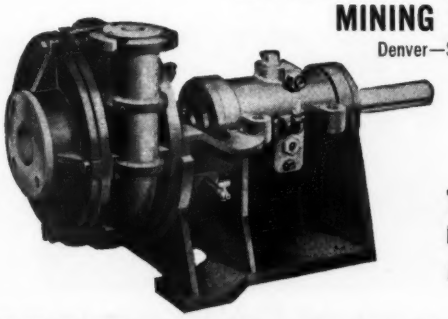



Two twelve-inch dredge pumps were put through the following test. One was of conventional design; the other, a Hydroseal, had clear sealing water between the impeller and side plates to prevent enlargement of the clearance. To simulate normal wear conditions in the conventional pump, clearances between the impeller and side plates were set at 1/16", 1/8", and 3/16". A head of 160 feet was developed for each test, and all other conditions were uniform for both pumps.

As can be seen above, the Hydroseal demonstrated superior performance right from the start, and since its initial performance is maintained without appreciable loss throughout pump life, this superiority will steadily increase as time goes on.

If you're investing in dredge, sand, or slurry pumps, find out what Hydroseals can do for you. Write for Catalog No. 451.

See our Exhibit—Booth 724
**MINING SHOW**
Denver—Sept. 22-25



**THE ALLEN-SHERMAN-HOFF PUMP CO.**
**Dept. K—259 E. Lancaster Ave., Wynnewood, Pa.**
*Representatives in Most Principal Cities*

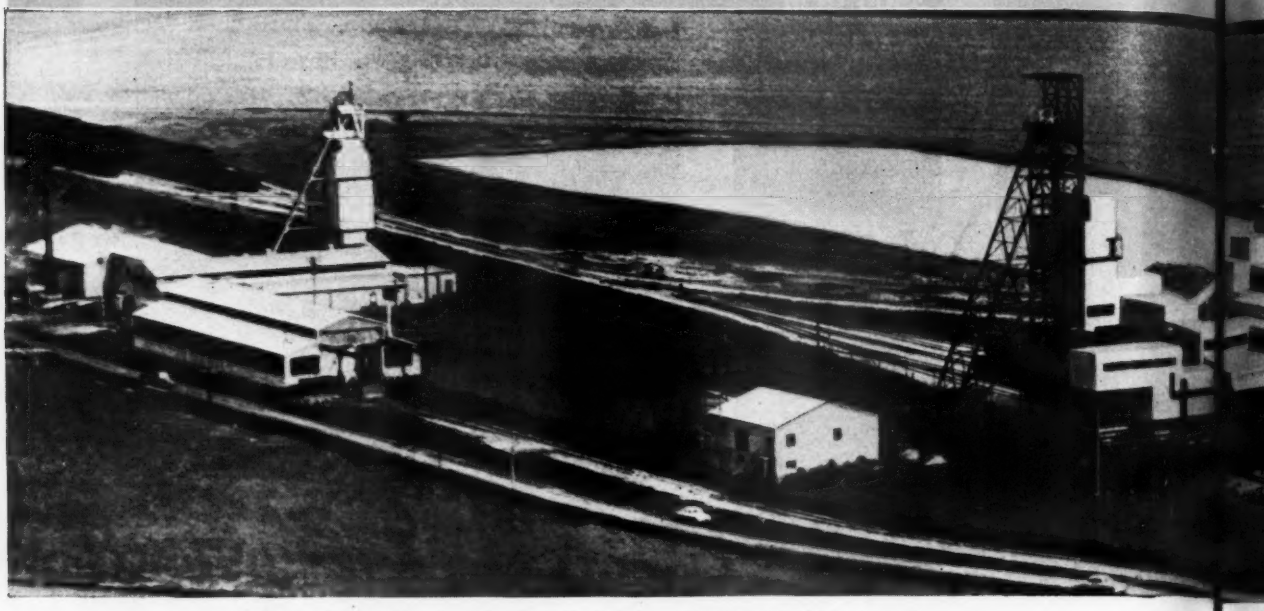
# HYDROSEAL

**SAND, SLURRY & DREDGE PUMPS**
**MAXIMIX RUBBER PROTECTED**

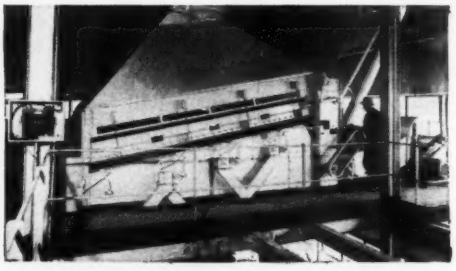
HYDROSEAL, PACKLESS AND MAXIMIX DESIGNS ARE COVERED BY PATENTS AND APPLICATIONS IN THE MAJOR MINING CENTERS OF THE WORLD

# Freeman's New R & S-Engineered

# CONVERTS LOW-PRICE STEAM COAL

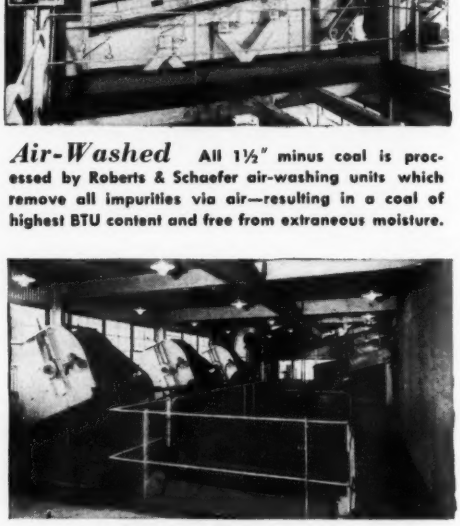


The New Crown Mine Plant, Farmersville, Illinois — Capacity: 10,000 tons per day.

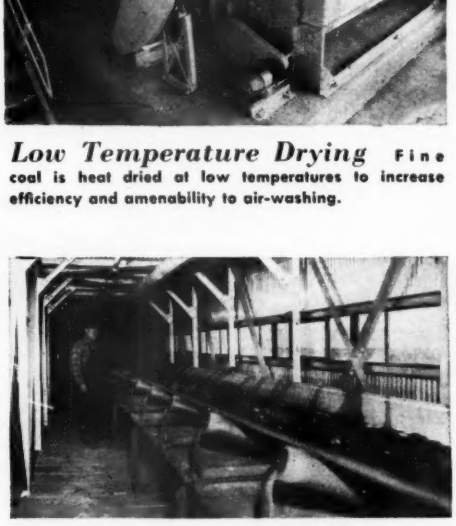


***Air-Washed*** All 1½" minus coal is processed by Roberts & Schaefer air-washing units which remove all impurities via air—resulting in a coal of highest BTU content and free from extraneous moisture.

***Low Temperature Drying*** Fine coal is heat dried at low temperatures to increase efficiency and amenability to air-washing.

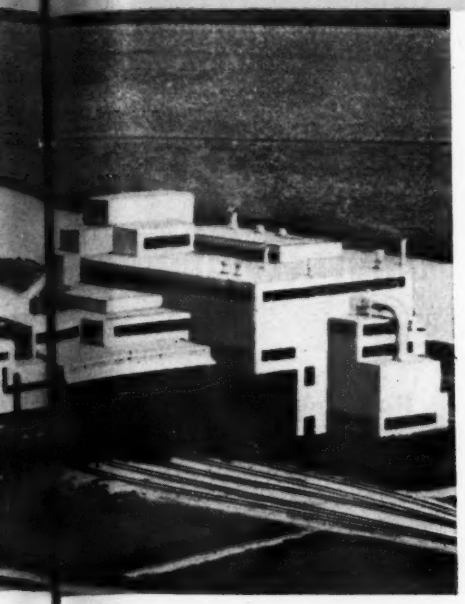


***Wet-Washed*** Crown 1½" plus coal is washed by large jig washers. This cleaning system together with air-washing results in a product that meets more exacting specifications.



***Conveyed on Rubber*** Crown Coal is conveyed on rubber in the main haulways as well as through the gallery and all surface installations. This method of handling preserves size and helps reduce degradation.

# ...ered Crown Mine Plant —
# ...M COAL INTO A PREMIUM FUEL



...ow-Head Screens The high rate of ...rolsen permits greater "flowability" resulting in more ...cing and uniform screened sizes, firmer coal and ...s degradation.

...ny Size At Crown the use of crushers stra...gically located throughout the preparation plant can ...uce washed coal to any size and specification.

You'd enjoy a trip through Freeman Coal Mining Corporation's new combination wet-and-dry-washing preparation plant at its Crown Mine at Farmersville, Illinois. You would see the most advanced technique, the most modern equipment applied to the problem of producing premium fuel from the Central Illinois No. 6 seam, which, for a number of years had been mined and shipped without beneficiation for use as a low-priced steam coal.

Step by step, you would see how modern preparation and handling combine to upgrade No. 6 seam coal to its maximum BTU potential *and maximum market value.*

Coordinated engineering, fabricating and construction service . . . a wealth of experience . . . unbiased counsel . . . a record of results: these are the things that companies look for and get from R&S. They are the reasons for more and more repeat business from satisfied operators like Freeman . . . reasons why you should consult Roberts and Schaefer Company when *you* have coal preparation problems.

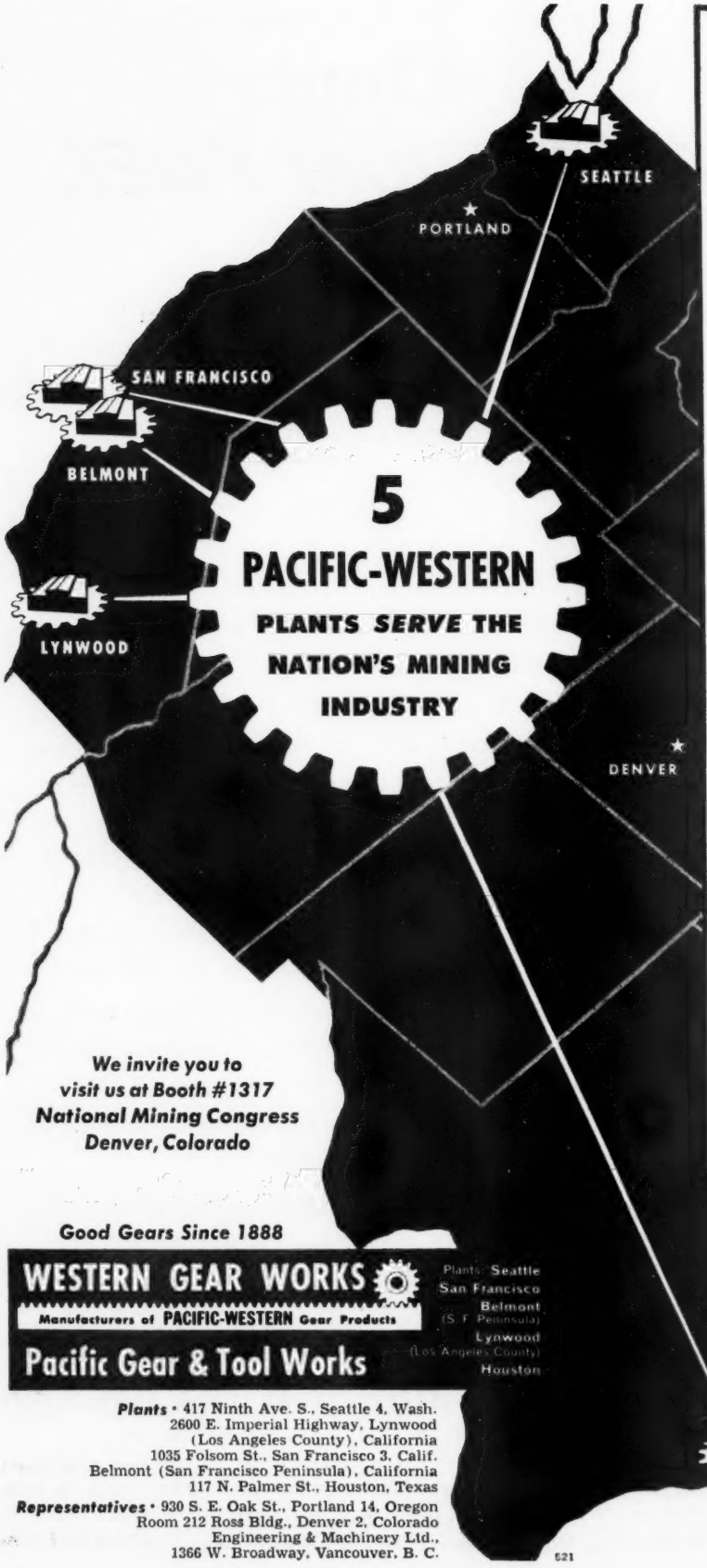
Like to know the full story of the Crown Mine Plant? Write for copies of the "Crown Story"—but do it today, because the quantity is limited.

## ROBERTS and SCHAEFER CO.

*130 North Wells Street, Chicago 6, Illinois*

1315 Henry W. Oliver Bldg. PITTSBURGH 22, PA. | P. O. Box 570 HUNTINGTON 10, W.VA. | 254 West 54th Street NEW YORK 19, N. Y.

FOREIGN DEPARTMENT:
International Mfg. & Equipment Co., Inc., 220 Broadway, New York 38, U.S.A.




# WESTERN HEADQUARTERS

***for Mining Gears & Geared Products***

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## ENGINEERING

***Gear products of all kinds***

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## MANUFACTURING

***Gears and Geared Products***

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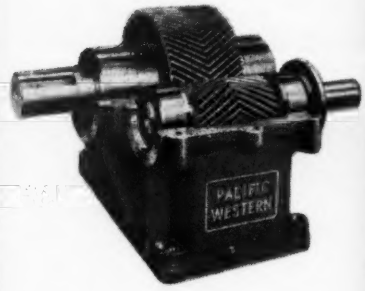
**Pacific-Western**

## SPEED REDUCERS

***all types and sizes***




Typical Pacific-Western single-reduction speed reducer—the product of more than 60 years of experience.

*Write or call your nearest Pacific-Western plant or office for prompt engineering information, service, or delivery.*

***Engineering Representatives**

***We invite you to visit us at Booth #1317 National Mining Congress Denver, Colorado***

***Good Gears Since 1888***

**WESTERN GEAR WORKS**

Manufacturers of **PACIFIC-WESTERN** Gear Products

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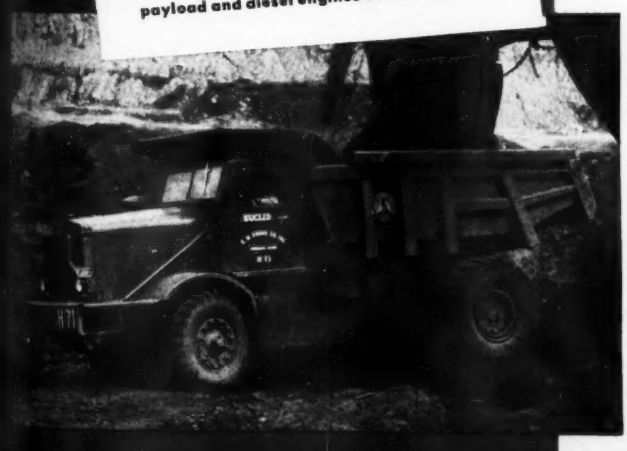
# IN MINES and QUARRIES

# JOB AVAILABILITY PAYS OFF!

Euclid Bottom-Dump Coal Haulers of 20 to 40 ton capacities have diesel engines to 300 h.p. . . . loaded speeds up to 34.4 m.p.h.

Rear-Dump Euclids of 10 to 34 ton capacity have travel speeds to 36.3 m.p.h. with full payload and diesel engines of 125 to 400 h.p.



For open pit mining and quarry operations, Euclids are unmatched for job availability and long service life. "Eucs" have large capacity and plenty of power and speed to move more loads per hour at more profit per ton.

Bottom-Dump Euclids are engineered and built as complete units with good weight distribution, and tremendous power. Short wheelbase of the tractor and the universal hitch design make them easy to handle and permit short turns in narrow cuts.

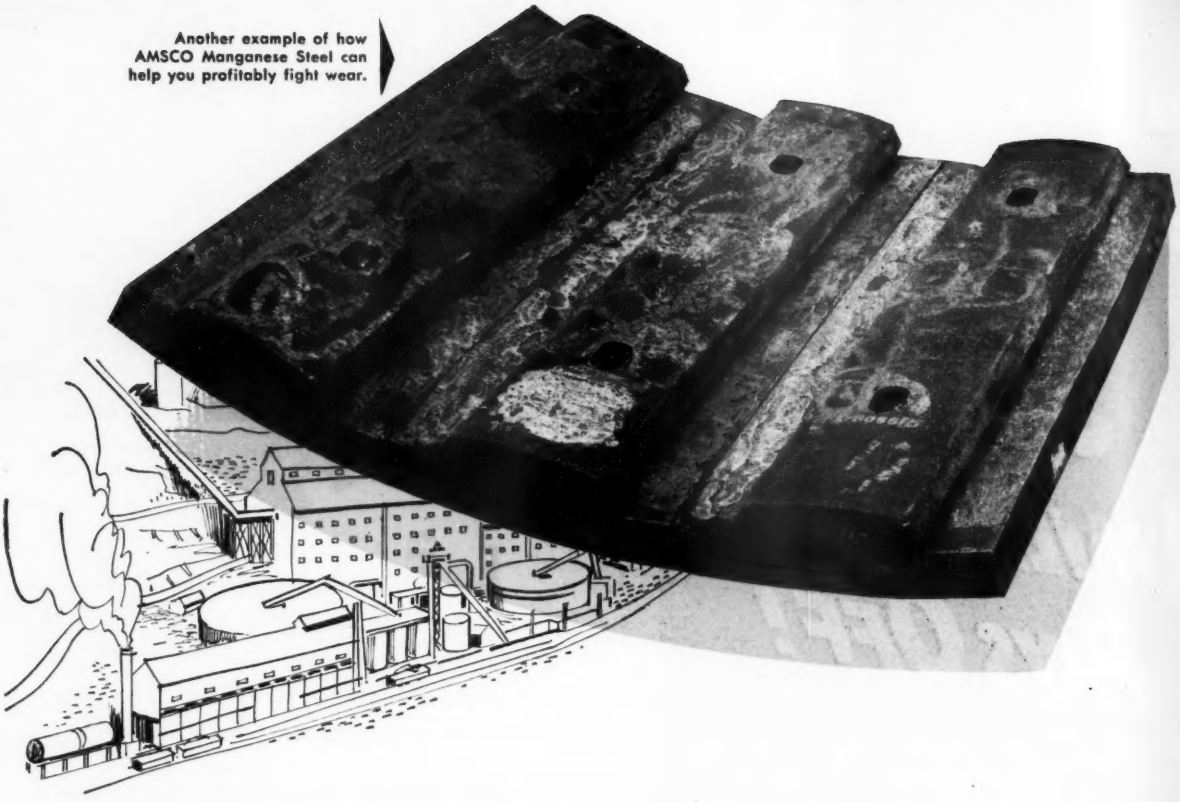
Rear-Dump "Eucs" have body designs for all types of materials—coal, ore, rock, overburden and other heavy excavation. Their rugged construction withstands the impacts of loading heavy materials and travel on rough roads—assures low operating and maintenance costs.

Put Euclids on the job and be on more jobs! Ask your Euclid Distributor for information on the models best suited to your off-the-highway hauling requirements.

**The EUCLID ROAD MACHINERY Co.**
**Cleveland 17, Ohio**

EUCLIDS Move the World

Another example of how AMSCO Manganese Steel can help you profitably fight wear.



# These LINERS lasted 6 times longer

## How AMSCO Manganese Steel increased production . . . lowered costs per ton

A large Western mine had a problem that's all too common . . . Rod Mill Liners that lasted approximately 100,000 tons before an expensive replacement job was necessary.

In July of 1949 something new was tried. This mine installed AMSCO Liners equipped with a specially designed renewable lifter. Result? The AMSCO Liners milled 640,208 tons . . . over 6 times the tonnage of the liners formerly used. There were two important reasons for this tremendous increase in service life:

**1.** The liners were made of AMSCO Manganese Steel, the toughest steel known for high resistance to abrasion and impact.

**2.** The overlapping type AMSCO Renewable Lifters took the brunt of the load—reduced the need for replacing the more expensive liners. The lifters alone milled 340,322 tons . . . over 3 times more than the old installation!

**WHEREVER YOU MEET A PROBLEM OF WEAR CAUSED BY IMPACT AND/OR ABRASION . . .**

. . . find out about longer-lasting, dollar saving Manganese Steel made by AMSCO . . . world's largest producer of Manganese Steel Castings for all industry.

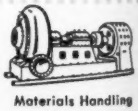
AMSCO controls impact and abrasive wear in 5 basic industrial operations:

Power Transmission

Mining and Excavating

Transportation

Crushing and Pulverizing



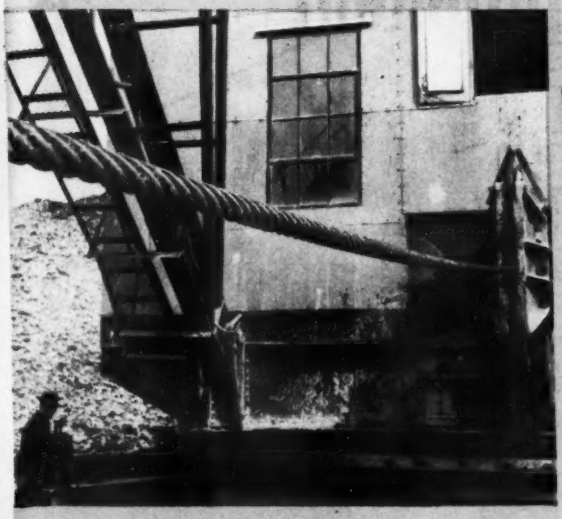
Materials Handling

AMERICAN Brake Shoe COMPANY

**AMERICAN MANGANESE STEEL DIVISION**

422 EAST 14th STREET • CHICAGO HEIGHTS, ILL.

# The Proper Rope *plus* Proper Maintenance



This new Tiger Brand Drag Line Rope was designed especially to resist the extremely severe operating conditions encountered in this class of service. On one job where ropes lasted an average of 600 hours, this Tiger Brand Drag Line Rope was still going strong after 1100 hours—believe it or not!

## *Equals* Longer Rope Life Lower Rope Costs

• Many prominent users of wire rope have found they can reduce wire rope costs as much as 50% by using a wire rope designed for the job. They get better rope service at lower rope cost by following this simple, job-tested system, with the help of the Tiger Brand Wire Rope Specialist.

Let this qualified expert make *sure* that you select, for each job, a wire rope that is strong enough to carry the load with an ample margin of safety . . . able to stand incessant flexing and sharp bending without failure of wires due to fatigue . . . built to take the most severe abrasion and crushing. Then make sure that every foot of wire rope you own is inspected, cleaned and lubricated *regularly*.

Engineers and contractors who follow this procedure tell us that they are getting twice — sometimes three times—the life they expected from Tiger Brand Wire Rope, plus greater safety for crews and equipment and freedom from rope-caused work stoppages, all of which means important money savings.

When you are in the market for wire rope, make full use of the engineering knowledge of an expert who has made a life-work of analyzing and solving wire rope problems. Just drop us a line and your Tiger Brand Wire Rope Specialist will be glad to consult with you. Meanwhile, why not send in the convenient coupon for a copy of our latest book?

More than a million tons of oyster shells have been converted into chemicals at this plant. The owners have found that Tiger Brand Wire Rope stands up best under these severe abrasive conditions, cutting rope costs, reducing down time and keeping equipment at top capacity.

**SEND FOR THIS NEW BOOK.** It contains specification data that will help you select the right rope for each application. In descriptive text, illustrations, diagrams and tables, it gives you complete information on types of rope, diameters, working loads and safety factors for all sorts of rope service.

American Steel & Wire
Rockefeller Building, Dept. N-8
Cleveland 13, Ohio

Please send me your new book, "Specification Data, Tiger Brand Wire Rope."

Name.....

Company.....

Address.....

City.....Zone....State.....

**AMERICAN STEEL & WIRE DIVISION**
**UNITED STATES STEEL COMPANY, GENERAL OFFICES: CLEVELAND, OHIO**
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO • TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA., SOUTHERN DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS

# U·S·S AMERICAN TIGER BRAND WIRE ROPE

*Excellay Preformed*

UNITED STATES STEEL

# Here's electrical equipment for record-breaking shovel performance!

This Westinghouse-equipped Marion shovel set a new world's record by removing over 1.5 million cubic yards of overburden in just one month at an Eastern coal-stripping operation. In addition, another Westinghouse-equipped shovel at the same mine stripped over 1.3 million yards.

### *Over a million yards a month averaged during 1951*

To attain this average, the shovel moved an average of over 2,000 yards per hour by moving 33.91 cubic yards per pass with an average time of 60.43 seconds per complete cycle. This fast operation is the result of the carefully co-ordinated design of Westinghouse generators, motors and Rototrol® control.

### *Smooth, controlled operation increases production*

The Rototrol control is the "brain" of the shovel operation. When fast action is necessary, as during the swing, Rototrol "forces" the electric drive. The responsive action is quick, fluid and smooth. This prevents any shocks to the equipment and speeds up your operation. Rototrol also makes it impossible to overstrain the machinery. For example, during the crowd operation, the motors will stall out rather than force the bucket and cables.

### *Dependability of equipment reduces down time*

The durability of the equipment is another reason for the record-breaking performance. The Rototrol, for example, is a simple, sturdy device that can be serviced right in the field. The M-G sets have special spherical-sleeve bearings which compensate for misalignment and permit operation even at tilts of 15°. The motors are designed and built to insure maximum durability.

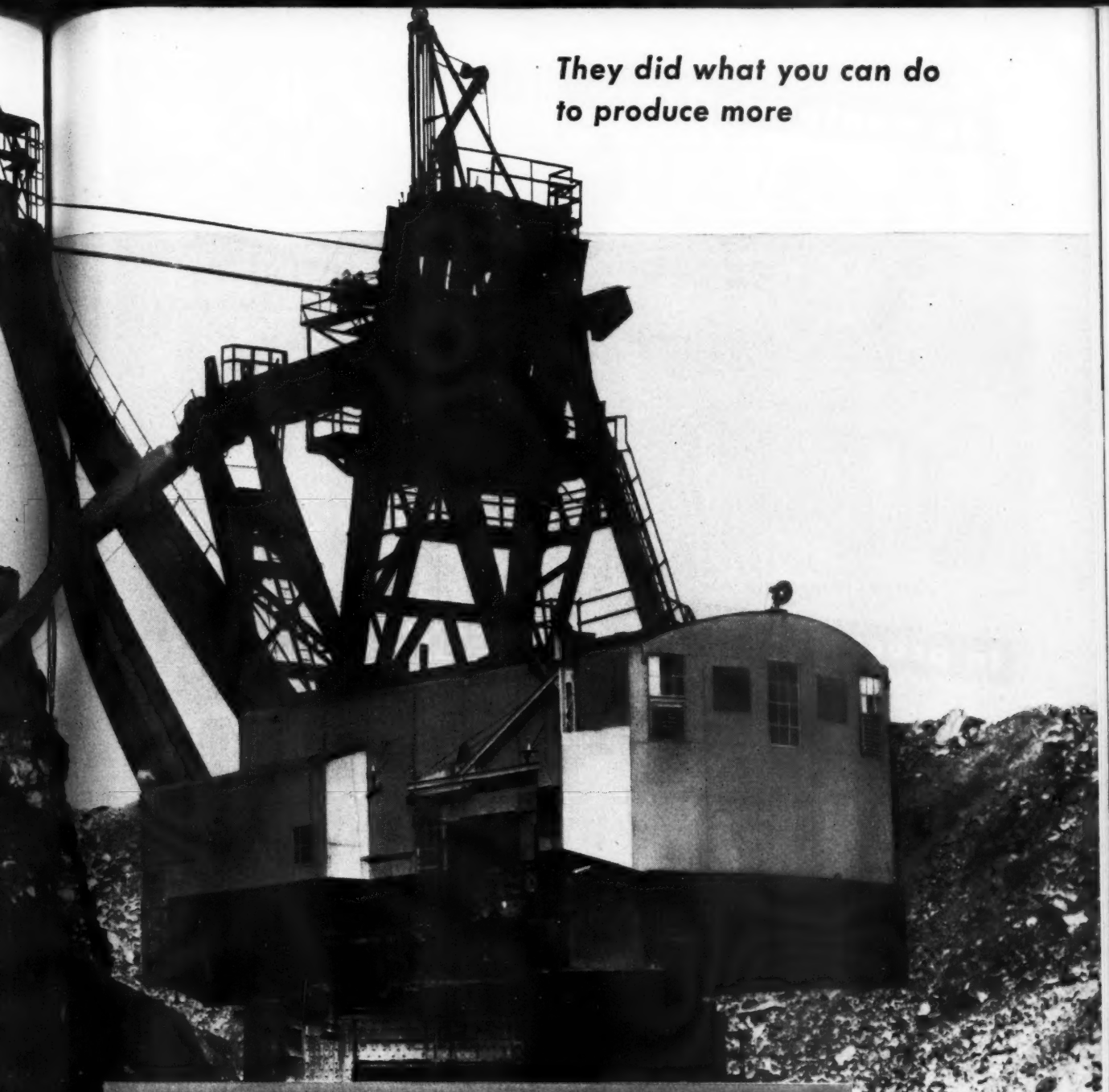
### *Call Westinghouse on your next project*

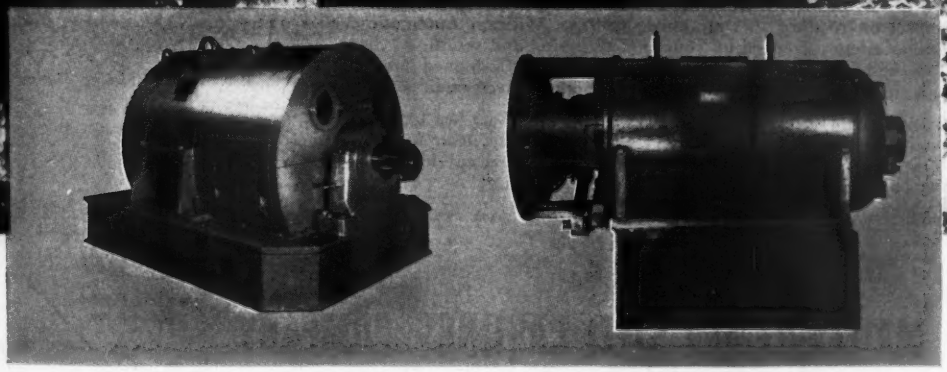
This is a good example of the performance Westinghouse builds into electrical equipment for mining. The next time you're planning a project, call in Westinghouse early. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-94879

Westinghouse

**EQUIPMENT FOR THE MINING INDUSTRY**

## *They did what you can do to produce more*





Westinghouse shovel motors are specially constructed to give you years of continuous operation even under the most rugged conditions. They are designed to help you get the most yardage out of your next shovel or dragline.

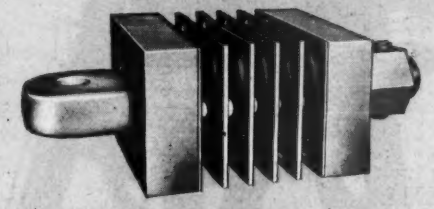
Rototrol is the master intelligence governing the shovel operation. It gives a quick, smooth responsive action to your operator's slightest control movement. This prevents shocks to equipment. The fast action cuts the digging cycle—speeds up production.

## In transportation...

Willison Automatic Couplers

National NC-1 Truck

National M-225 Rubber-Cushioned Draft Gear

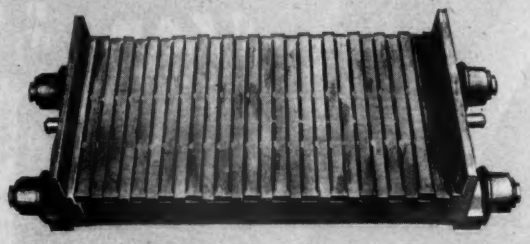


National M-230 Rubber-Cushioned Draft Gear

Naco Steel Swivel Hitching and Link

## In processing...

Ore-Grinding Balls



Cast Steel Pallet and Mallix Sintering Bars

# NATIONAL equipment cuts per-ton costs

Decades of experience combined with resourceful and advanced engineering have placed NATIONAL in the forefront as a producer of mine and industrial equipment for increasing safety at reduced per-ton cost.

New National NC-1 Trucks provide a smoother ride that results in less wear on cars . . . reduces impact on roadbed . . . minimizes spillage. Willison Automatic Couplers give maximum safety . . . speed up coupling, gathering and shunting . . . reduce surging, spilling and danger of derailment. National Rubber-Cushioned Draft Gears provide smooth cushioning action that reduces shock and protects equipment.

National Cast Steel Pallets and abrasive-resistant Mallix Sintering Bars last longer . . . reduce equipment down time. Capitol Foundry Co. and Arizona Iron Works of Phoenix, and Rotary Steel Casting Company of Denver, National subsidiaries, produce ore-grinding balls that cost less per pound of ore ground.

Specify National products—*handle larger daily tonnages at lower per-ton cost.*

A-5849

National Products will be on display at the Mining Show Denver, Sept. 22—25

NATIONAL Products FOR TRANSPORTATION AND INDUSTRY N M & S Co. Est. 1868

## NATIONAL MALLEABLE and STEEL CASTINGS COMPANY

Cleveland 6, Ohio

Willison Automatic Couplers • Friction & Rubber Draft Gears • Car Trucks • NACO Steel Wheels • NACO Steel Links & Swivel Hitchings

# Bucyrus-Erie Leadership in Walking Draglines...

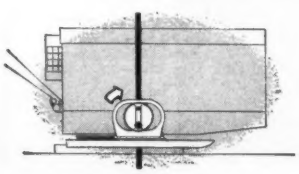
## *Exclusive* ROLLING-CAM WALKING ACTION

One big reason why Bucyrus-Erie draglines are such smooth, steady workers is that they are smooth, steady *walkers.* They can step out in any direction . . . on loose sands, over swampy ground, along muddy river bottoms and the edges of banks . . . through weather that would stop crawler mounted machines.

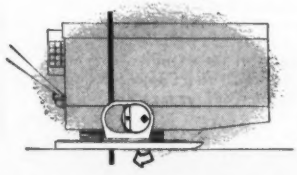
There's no jerking . . . no shocks to machinery, either, because the weight of the dragline is cushioned with almost unbelievable ease by Bucyrus-Erie's exclusive rolling-cam walking action.

100L52

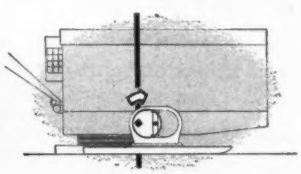
**No other walking system is so smooth, so strong or so simple in design**



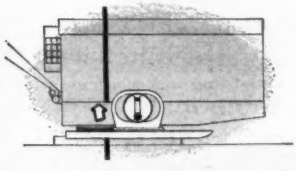
1. Working position. Shoes up—cams in center—guide roller pin at top.



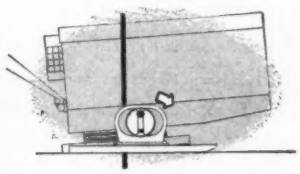
4. Base is lowered as cams continue to roll.



2. Cams rotate—advance shoes and place them on ground.



5. Rotation completed—return to original position.



3. Leading edge of base lifts and skids along as cam rolls to half-way point in rotation.

BUCYRUS ERIE

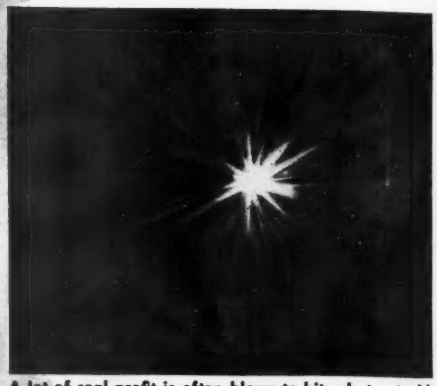
South Milwaukee
Wisconsin

get all the coal out of

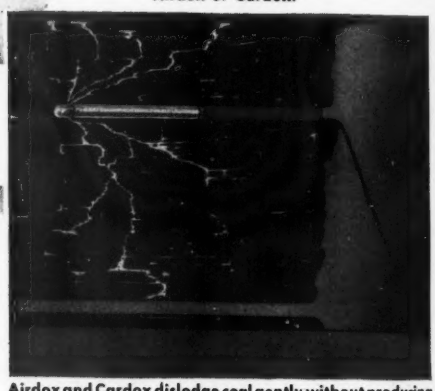
# AIRDOX
# CARDOX

NON-EXPLOSIVE MINING METHODS

## Give You Higher Coal Production at Less Cost



A lot of coal profit is often blown to bits—but not with Airdox or Cardox.



Airdox and Cardox dislodge coal gently without producing excessive fines, degradation or damaging the mine roof.

The first place to increase your mine profits is right at the working face.

And it's here that Airdox or Cardox can help you get out more coal—faster—and in easier-to-handle form than is possible by other methods. Using the powerful, but smooth, acting force of compressed air or expanding carbon dioxide, they "heave" coal out and roll it forward in loose piles for easy mechanical loading. There's no shattering blast to smash much of the coal into undesirable fines or to raise excessive dust that can cause fires or explosions. Mine roofs aren't shatter-cracked; extra timbering needs are reduced.

With Airdox or Cardox, men and equipment can go to work immediately after coal has been dislodged. Because less fines are produced, the coal is easier to clean and process. Degradation is also minimized.

Over a period of years—and in more mines every year—Airdox and Cardox have proven their value. Both are adaptable to almost any mine with practically no change in operation necessary.

### *Which Method for You?*

**Both Airdox and Cardox offer impressive advantages and economies. Which is best for you can be determined after our engineers have studied your mining operation. There's no obligation—ask that one of our men call on you soon.**

# work mine profitably

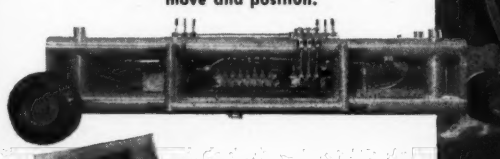
## CARDOX-HARDSOCG Underground AUGER MINER

Where thin seams or poor roof conditions make mining by regular methods unprofitable or unsafe, this simple, low cost AugerMiner earns bonus money for you. It takes over where regular methods stop. With little or no added development expense, you can drill out tonnage that otherwise would be lost. The coal produced is cheaper to process because the AugerMiner drills out coal free of impurities from roof or bottom.

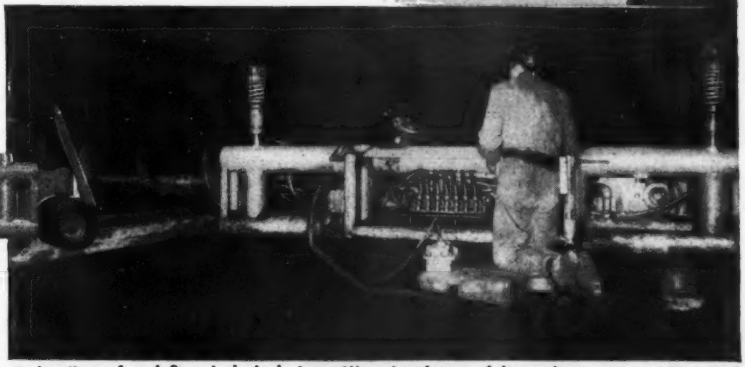
The AugerMiner teams with a mechanized conveyor for the ultimate in fast, efficient loading. The AugerMiner can "reach" as far as 100' into a seam for extra coal. Powered by a 25 HP electric motor, it can handle augers to 28" in diameter.

Operators work in safe, easily timbered areas. Coal between holes in the seams provide ample support for roof in drilling areas. All controls are centralized for speedy operation by minimum crew.

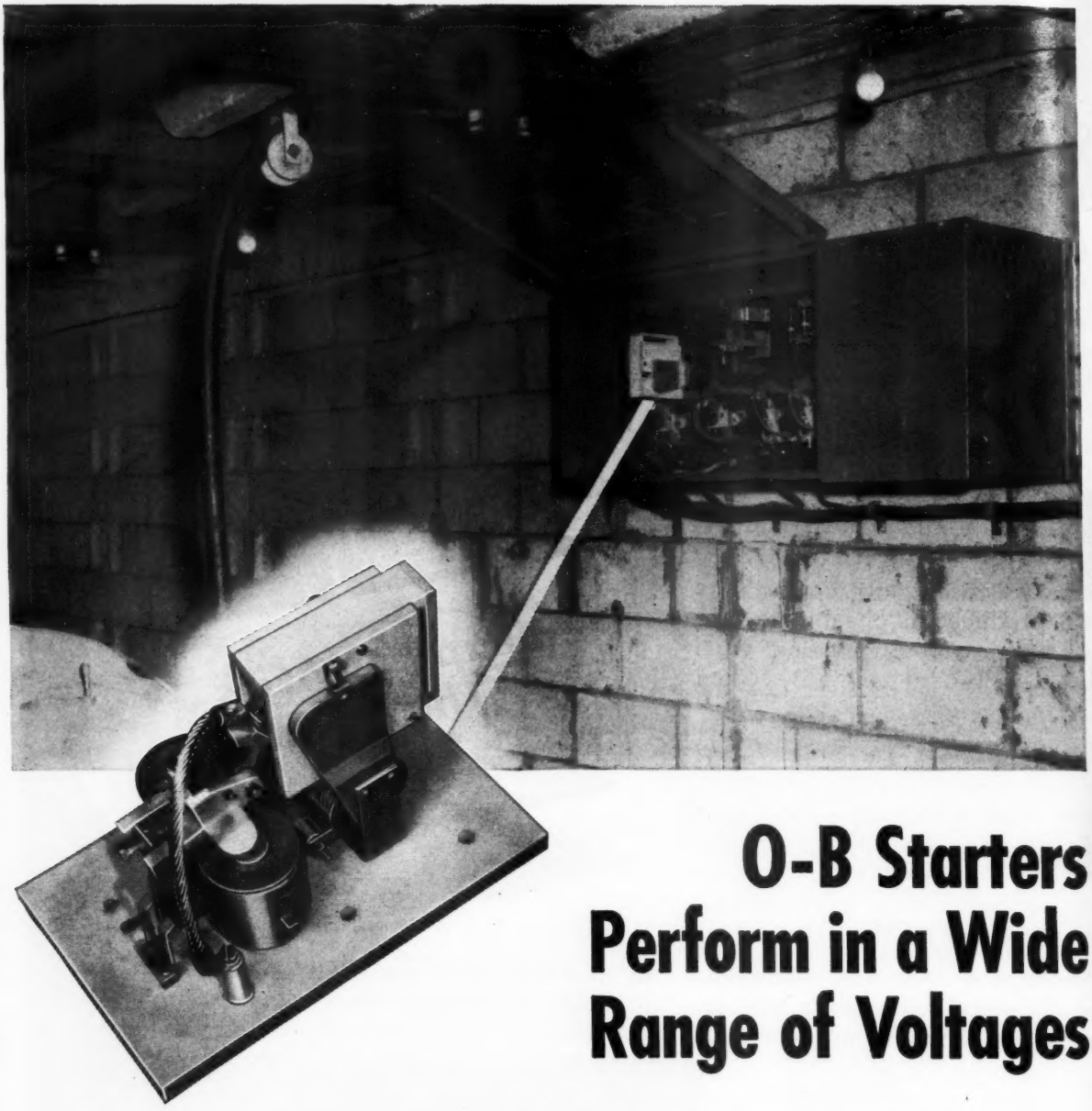
Removable tramming gear and low overall height makes the AugerMiner easy to move and position.



AugerMiner is fully described in new bulletin. Write for your copy today.



Hydraulic roof and floor jacks lock AugerMiner in place and keep the auger positioned or aligned for directional control.



# O-B Starters Perform in a Wide Range of Voltages

Quick, easy access to all parts of the O-B Contactor is a feature mine electricians will appreciate.

***For complete information on all O-B Motor Starters, write to Ohio Brass Company, or talk to your O-B representative. Ask for Motor Starter Booklets.***

Ohio Brass

MANSFIELD OHIO, U. S. A.

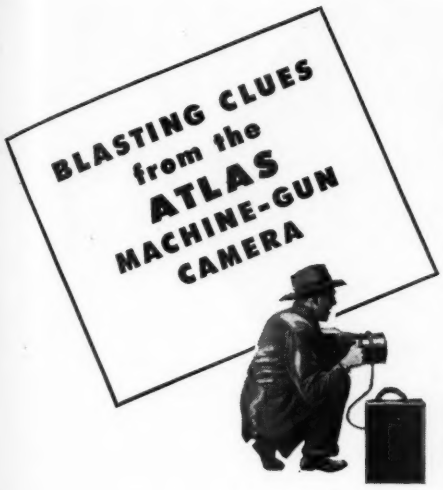
CANADIAN OHIO BRASS CO., LTD., NIAGARA FALLS, ONT.

For dependable service throughout the voltage range between your substations and working places, choose an O-B Motor Starter. You'll get contactors that close with a snap at lowest voltages, and contactor coils that do not heat at the highest voltage! You'll get a starter that functions instantly—safely—at work cycle peaks, when current demands are heavy, or during off-shift periods of light load.

Why risk starter troubles, with lost production, while the mine is working? And why take chances on starter protection for pumps or fans when the mine is down? Choose one of the six new O-B Motor Starters for each vital motor, and your starter troubles will be a thing of the past!

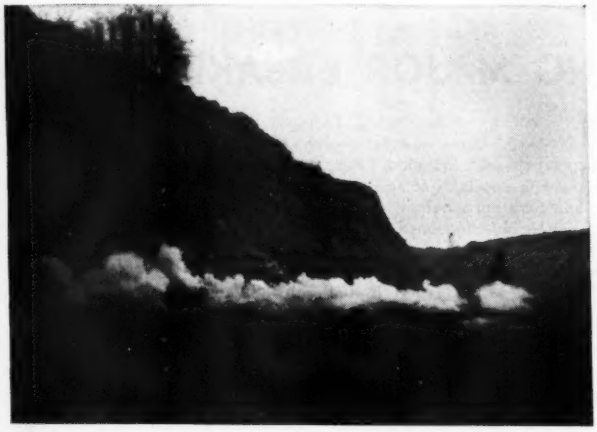
4294-M

[ *Page 30* ]




# Point of Detonation ...Front or Back?

***Pictures show increased breaking of overburden with initiation at point of maximum confinement***



### *Point of Detonation: FRONT*

Here are five holes 2/3 second after detonation from the front. There is no perceptible movement of the high wall. Much of the explosives energy seems to be blowing out the holes, despite the fact that each had 16 feet of stemming. Possible explanation for this is that the blast began at the weakest point rather than at the back of the hole where the greatest degree of confinement can be gained.

### *Point of Detonation: BACK*

On the same high wall a single hole was drilled in the tight with no relief on either side. The same amounts of dynamite and stemming were used, but note that in this photo, also 2/3 second after detonation (at the *back*), the stemming is holding. And see that action on the high wall! Here the explosives force is being put to work efficiently and the burden gets the thorough shaking it must have for easy loading. Another instance where proper shooting technique can result in not only better breakage but in much less noise, less waste of power.

*Send today for your free copy of the 20-page* ROCKMASTER® *handbook giving loading patterns for milli-second delay blasting in coal stripping operations.*

**ATLAS EXPLOSIVES**

ATLAS

*"Everything for Blasting"*

**ATLAS POWDER COMPANY • WILMINGTON 99, DELAWARE**

***Offices in principal cities***

SCOTIA COAL & COKE CO.
MOVED 1,440,000
TONS OF COAL

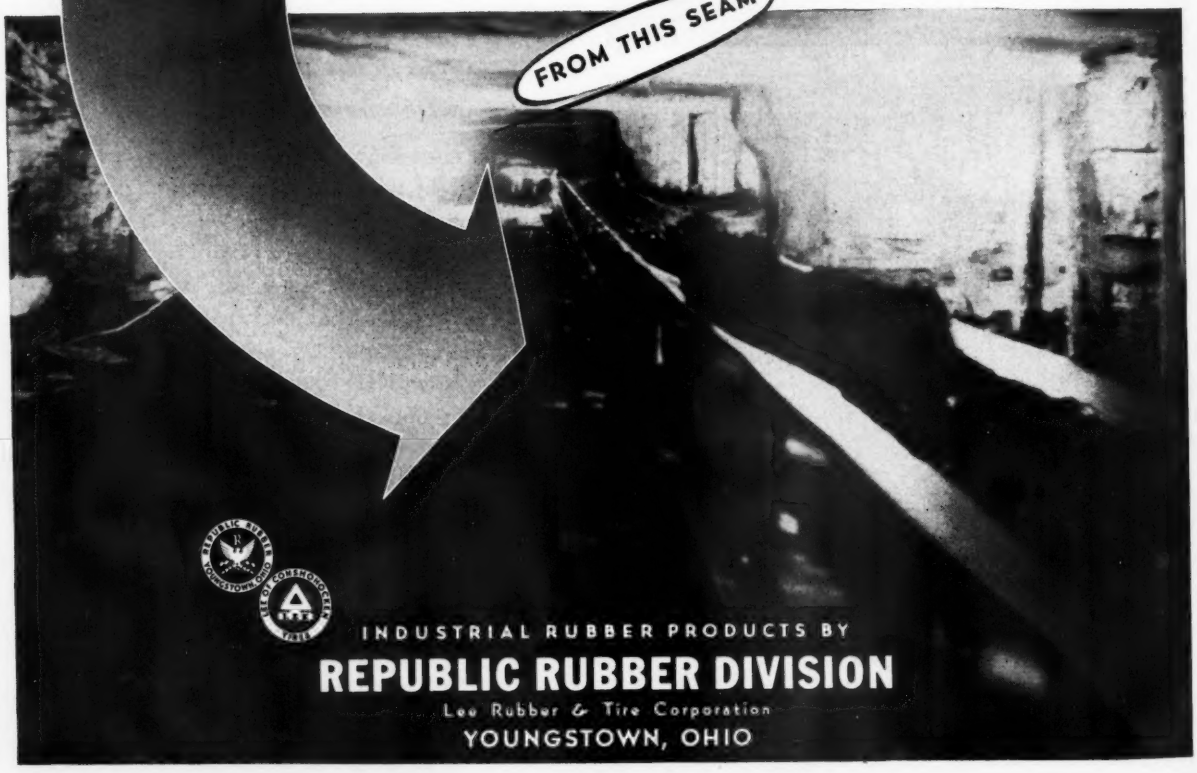
ON THIS BELT

## NO MAJOR BREAKDOWNS!!

● This rugged, tough, Republic Record Maker coal handling belt has been on the move now for nearly six years helping the Scotia Coal & Coke Company cut costs in their #3 Rush Run Mine at Brooklyn, West Virginia. The belt, made with specially compounded, abrasion-resistant cover and shock-insulated, mildew-resistant inner plies, has proved its ability to stand up under constant flexing, severe buffeting, impact and all service stresses of mining operations. Republic Record Maker Conveyor Belting is available in both straight and step-ply construction through your local Republic Distributor.

Your Republic Distributor is an expert in the application and care of Industrial Rubber Products who carries a complete line of hose and belting, specially designed for coal field service. Contact him today or write direct for full facts.

FROM THIS SEAM



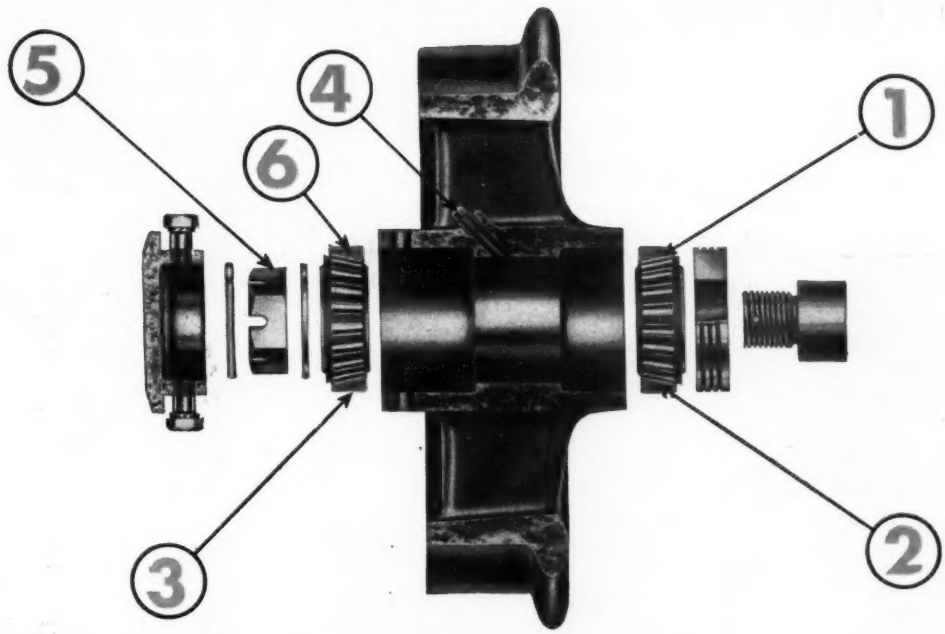
INDUSTRIAL RUBBER PRODUCTS BY

**REPUBLIC RUBBER DIVISION**

Lee Rubber & Tire Corporation

YOUNGSTOWN, OHIO

# LOOKING FOR A WAY TO CUT HAULING COSTS?




## *TIMKEN® bearings cut costs 6 ways*

Check these cost-cutting advantages and you'll see why over 500,000 mine cars are now rolling on Timken® bearings.

**1 GREATER RESISTANCE TO SHOCK LOADS.** Timken bearings insure trouble-free mine car performance . . . eliminate costly time-outs for repairs. They stand up under the pounding a mine car gets because they're made of Timken fine alloy steel and case hardened to provide a hard, wear-resistant surface and a tough, shock-resistant core.

**2 ADDED CAPACITY.** Since loads are carried on a *line* of contact between rollers and races, Timken bearings have load-carrying capacity to spare.

**3 EASY STARTING, LONGER TRAIN LENGTHS.** True rolling motion plus smooth surface finish of rollers and races in Timken bearings practically eliminate friction. Trains start easily, more cars can be hauled.

**4 SAVE ON LUBRICATION.** Since Timken bearings keep housing and shaft concentric, they make closures more effective. Lubricant stays in, reducing maintenance—dirt and moisture stay out, reducing wear.

**5 INSPECTION SIMPLIFIED.** Timken bearings help simplify wheel mountings. They can be inspected by merely pulling the cap, cotter pin and nut.

**6 NO NEED FOR SPECIAL THRUST PLATES.** Timken bearings take radial and thrust loads in any combination because of their tapered construction. Cars take curves easier, require no special thrust plates.

Get these cost-saving advantages in your mine cars by specifying Timken tapered roller bearings. Look for the trade-mark "Timken" on every bearing you use. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

**CUT YOUR COSTS BY SPECIFYING**

**TIMKEN**

TRADE-MARK REG. U. S. PAT. OFF.

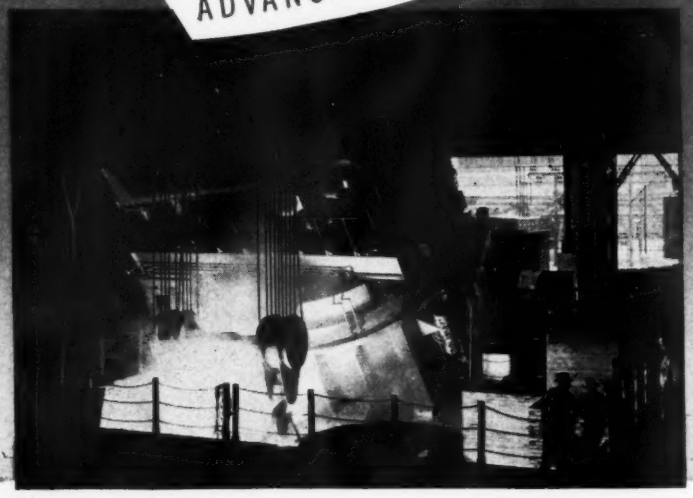
*TAPERED ROLLER BEARINGS*

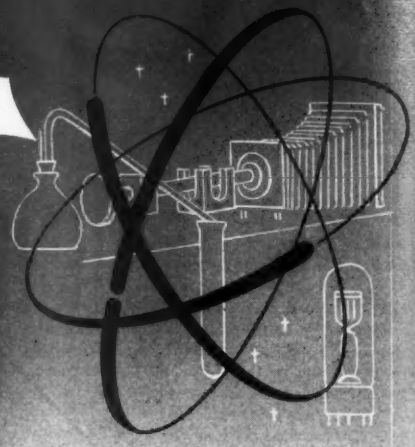
NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL ◎ AND THRUST ◎ LOADS OR ANY COMBINATION ◎

# Steel

## BULWARK OF FREEDOM AND...

## LABORATORY FOR THE ADVANCEMENT OF QUALITY





***Another Electric Furnace Increases Sheffield Steel Making Capacity***
**At both the Houston and Kansas City Sheffield steel mills, ultra modern electric furnaces supplement the many open hearth furnaces in making Sheffield Steel. Also added to Sheffield's steel making facilities is a new and modern laboratory.**

Steel enters into every product. Steel is either a part of the product or is used in its production—or both.

Advancement of quality in many products very often must begin in the steel maker's laboratory.

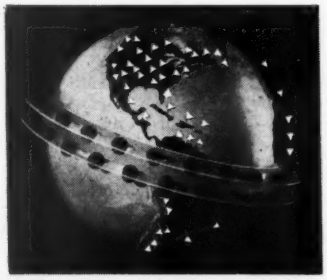
At Sheffield Steel Mills is the most versatile metallurgical laboratory West of the Mississippi and East of the Rockies. It is complete with chemical and physical equipment. Its technical staff continuously searches for improved formulae for a wide diversity of steels and for better processes of heat treatments under automatic pyrometric control.

Then, from raw materials to finished steel, samples are micro and macro etched and photographed for metallurgical observation of porosity, grain structure and faults. The physical laboratory constantly runs impact, fatigue, tensile and hardness tests including stress-strain diagrams.

And, Sheffield's advancement of quality to higher and higher levels goes beyond this. Inspection data is analyzed at every step of manufacture by statistical methods. Thus statistical quality control quickly points out the slightest variation from the high uniform level prescribed.

**SHEFFIELD**
**STEEL**
**CORPORATION**
HOUSTON KANSAS CITY
TULSA
SUBSIDIARY OF ARMCO STEEL CORPORATION

**SHEFFIELD**
**MOLY-COP**
COPPER-MOLYBDENUM ALLOY
*Grinding Balls*
USED and PROVED ALL AROUND THE WORLD



IRON AND STEEL *SCRAP* MEANS.....

**MORE STEEL FOR AMERICA**
*More Money In Your Pocket!*

*GET YOURS OFF TO*
THE DEFENSE LINES NOW!

# A new development for moving hot and abrasive materials...

*It's worth investigating*

**For the past 20 years the inherent strength, capacity and power of the GOODMAN SHAKER CONVEYOR has ideally suited it for moving coal, ore, rock and slate in underground mines. Now a troughing has been developed to handle hot and abrasive materials in industrial plants.**

### HANDLES THE ROUGH JOBS

Transports wet or dry materials: coke, sinter, dolomite, steel scrap, mill scale, castings, silicon carbide, bauxite, and other ores.

### VERSATILE

Adaptable to short or long distances, small or large tonnages—upgrade, downgrade, or on the level. Powered by electric or air drive.

### ENGINEERED TO YOUR CONDITIONS

This special Goodman service assures you of a trough line and drive unit exactly right for your job—a conveyor system that will give you high continuity of operation, low maintenance cost.

You are cordially invited to visit the Goodman exhibit at the September Metal Mining Show in Denver. Included in our material transporting equipment display will be an industrial shaker conveyor set-up, with experienced engineers on hand to talk over its application.

BC644 Shaker conveyor transporting hot castings and mold sand to shakeout.

**Goodman**
**MANUFACTURING COMPANY**
Halsted Street at 48th • Chicago 9, Illinois

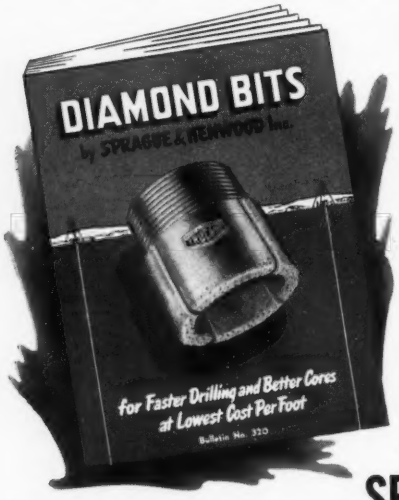
**A complete line of electric locomotives and belt conveyors for metal mine service.**

# New and Better Diamond Bits

## for Modern High-Speed Drilling

ALWAYS a leader in its field, Sprague and Henwood, Inc. has been working for a number of years on the development of new types of diamond bits, to supplement their well-known "TRUCAST" bits, which are still unsurpassed for many diamond drilling requirements.

NOW, after having been thoroughly proved by Sprague and Henwood's contract drilling crews, under every variety of drilling conditions, these new bits are available to other users. Two new types of "Powdered Metal" matrices; improved "Cast Metal" matrices; "Impregnated" coring bits; a new faster-cutting "Taper" bit for drilling blast holes in very hard rock—are all illustrated, described and tabulated in a new 16-page bulletin No. 320. Write for it today if you can use it to advantage. No charge or obligation.

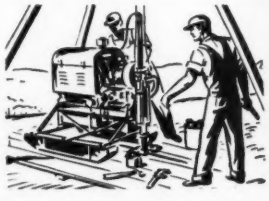



## Drilling Machines and Accessory Equipment

To get the full benefit of our new diamond bits you need drilling machines with plenty of power and a wide range of both speed and feed. Model 40-C is our latest-model core-drilling machine and can be relied upon for best possible all-round results on holes up to 1000 feet in depth. Other modern machines provide for very deep core-drilling and for either core-drilling or blast-hole drilling underground. We also manufacture a complete line of improved accessory equipment. Illustrated bulletins containing detailed information mailed on request.

## CONTRACT DRILLING

We do drilling by contract and are one of the oldest and largest contractors for any type of core drilling. Experienced crews are available at all times for service anywhere in the world. Estimates submitted promptly.



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for lower **first** and **last** costs

power with this tough cable

# ANACONDA

## BUTYL-INSULATED HIGH-VOLTAGE CABLE

*—easier to install—lasts longer*

*—handles better*

Mine after mine comes up with the same answer. So do pit and quarry operators. *It pays to use this modern power cable*—ANACONDA Type AB*, for uses up to 15 kv. It is exceedingly hard to damage by impact, crushing, twisting or abrasion. Butyl insulation has superior long-aging characteristics, improved resistance to moisture, ozone, heat. Neoprene jacket—as tough as they come—has real flexibility and great strength. This cable handles well and lasts longer in all weather. It has high dielectric strength, affords excellent protection against acids, oils, and even flame.

Our mine specialists will gladly show you a sample of this safety cable. And they can also show you just the right cable for your shovels, drills, shuttle cars, and the new continuous mining machines. See how recent improvements have made famous ANACONDA Securityflex* portable cables even better. Call your nearest Anaconda Sales Office or Distributor. Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.

*Trademark 52356

- *butyl insulation*
- *neoprene jacket*
- *copper tape shielding*
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the right cable for the job **ANACONDA®** wire and cable

BUILT FOR TODAY'S GREATER POWER NEEDS

# THE IMPROVED Exide-Ironclad BATTERY

**for battery-electric mine locomotives, trammers and shuttle cars of all sizes, types and makes**

**IT'S OUTSTANDING**... in design, performance, length of life. Back of the improved Exide-Ironclad battery are years of progressive research-engineering that have developed a continuous flow of improvements. *Now comes another great advancement*...

**A NEW and EXCLUSIVE FEATURE**—the polyethylene insulating tube sealer. This and other major improvements combine to make Exide-Ironclad, *more than ever before*, YOUR BEST POWER BUY ... AT ANY PRICE.

## BUILT TO GIVE YOU...

**RAPID, HIGH-PRODUCTION HAULAGE, more trips per shift ... HIGH MAINTAINED VOLTAGE, with uniform speed to end of shift ... HIGH AVAILABILITY ... LOW OPERATING COSTS ... LOW MAINTENANCE COSTS ... LOW DEPRECIATION COSTS ... SAFETY from hazards of fire and fumes.**

## BECAUSE OF...

*IMPROVED POSITIVE PLATE CONSTRUCTION*

... the long-life grids now contain SILVIUM—an alloy of silver, lead and other components—which make them highly corrosion resistant. Top conducting bar is heavier.

... with the New Polyethylene insulating tube sealer

An insulating sealer for the bottom of the tubes. Acid-proof, non-corroding plastic, it fits snugly into slotted tubes of positive plate, and reduces loss of active material. Even the small sediment deposit of the past is reduced 50%. Thus, more active material remains available, and the high battery capacity is sustained for longer working life.

## YOUR BEST POWER BUY..

### *PERMANIZED NEGATIVE PLATES*

Improved processing, a result of Exide Quality Control assures uniform plates with higher electrical efficiency. These negatives, teamed with the improved positive plates, give you a well-balanced combination for hard service and long life.

### *NEW SEALING COMPOUND*

Through the cooperative efforts of Exide Laboratories and the Franklin Institute, a new homogeneous compound was developed. It makes a permanent seal between the jar and cover, resisting shock without cracking in high or low temperatures.

### *SEAMLESS SHOCK-PROOF JAR*

Made of high quality rubber. A scientifically selected combination of tensile strength and elongation provides a sturdy jar built for long life and heavy-duty service.

### *CORROSION RESISTANT TRAY GUARD*

A plastic acid-resistant steel tray coating with high insulating quality and ability to withstand hard knocks.

### *NEW UNBREAKABLE PLASTIC VENT PLUGS*

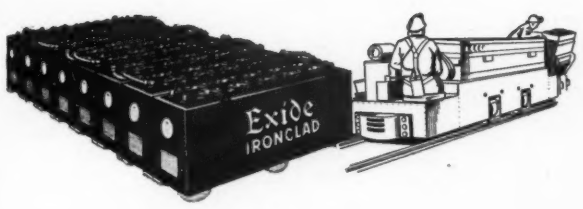
Made of unbreakable polyethylene. Can be quickly and easily removed to add water.

Types and sizes for storage battery applications in all heavy-duty services.

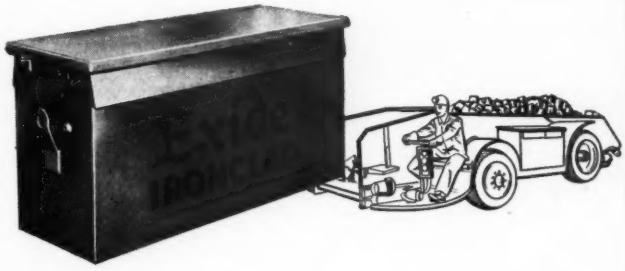
*Write today for further information.*

THE ELECTRIC STORAGE BATTERY CO.
Philadelphia 2
*Exide Batteries of Canada, Limited, Toronto*

"EXIDE-IRONCLAD" "SILVIUM" "PERMANIZED"
*Reg. Trade-marks U. S. Pat. Off.*



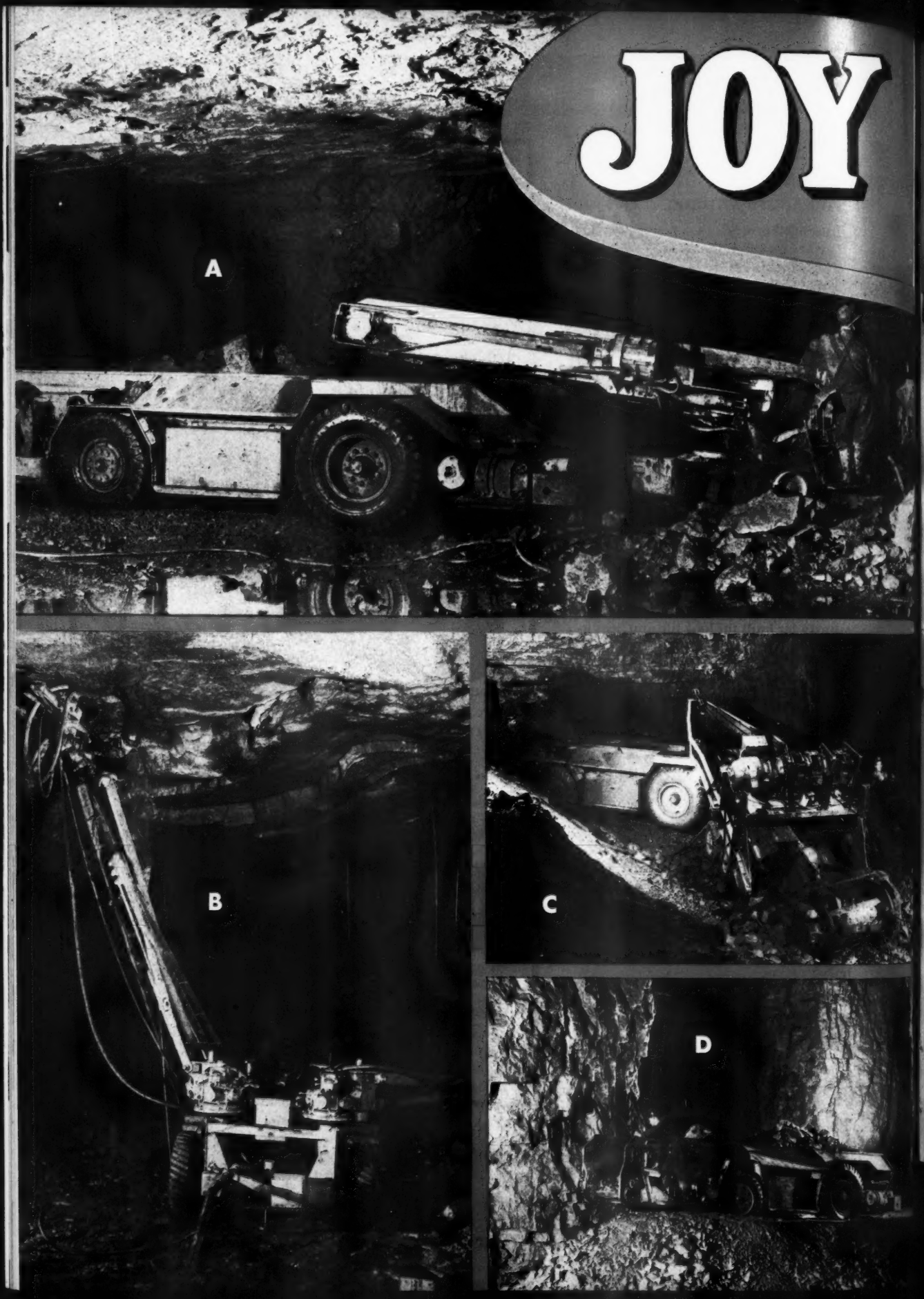

**FOR MINE LOCOMOTIVES**



**FOR SHUTTLE CARS**

**FOR TRAMMERS**

# . . AT ANY PRICE


JOY
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# MECHANIZED EQUIPMENT

## reduces costs—increases tonnage

## . . . does the DRILLING, LOADING and HAULING JOBS with TOP EFFICIENCY

### JOY DRILLMOBILES

In photograph B on the facing page, the long reach of a JOY Drillmobile is being utilized in taking down back. These rubber-tired, self-propelled, twin-boom units are setting new standards of fast, low-cost drilling in modern trackless mining, both in the metal and non-metallic fields. JOY Drillmobiles are fast-tramming, highly maneuverable machines, available in three sizes for work in any size heading or in stopes where the grade is not too steep. Drills can be equipped with long feed or standard drifter cradles and are mounted on JOY Hydro Drill Jibs, which make hole-positioning easy and accurate, and permit remote control for maximum safety. ● *Write for Bulletin 87-F.*

### JOY 18-HR-2 LOADERS

Photograph A at the top of the page at left shows a JOY high capacity, continuous-type Hard Rock Loader in operation, loading into a JOY Shuttle Car in one of the mines of the Southeast Missouri Lead Belt. This heavy-duty, crawler-mounted machine loads up to 12 tons per minute, producing high tonnage at low cost in trackless mining. It is ruggedly built to handle hard and abrasive rock and ores. The JOY gathering mechanism (not shown in the picture) assures top efficiency, and the chain conveyor swings 45° to either side of center to meet various loading requirements. A smaller model, the JOY 17-HR Loader, is built for use in more restricted areas. ● *Write for Bulletin J-108.*

### JOY SHUTTLE CARS

The versatility and flexibility of JOY Shuttle Cars in metal and non-metallic trackless mines is well illustrated by the photographs on the opposite page. In photos A and C, JOY Model 60 Shuttle Cars are shown being loaded by a JOY Hard Rock Loader and a scraper, respectively; and in photograph D, a car is shown making fill. JOY Model 60 Shuttle Cars (up to 14 tons capacity) are designed to give you rapid and low-cost transferring of rock and ore from loading points to main haulage systems. They are ruggedly-built, fast-tramming cars, with conveyor bottoms to speed loading and unloading and are available with hydraulic cable reel, trolley or diesel drive to suit operating conditions. ● *Write for Bulletin J-200.*

### JOY SLUSHERS

In photograph C on the facing page, a JOY electric motor-operated three-drum Slusher is shown mounted over a scraper ramp, which in turn is mounted on a JOY Drillmobile chassis for easy maneuverability in a Southeast Missouri mine. JOY Slushers are available in a full range of two and three-drum models, including air or electric-powered types, adaptable for automatic or remote control if desired and built for heavy duty with low maintenance. Allied JOY equipment includes a complete line of air, electric or gasoline engine-powered single-drum Hoists, Air Motors and Winches, Carpullers and Ropepullers, Sheave Blocks and Scrapers. ● *Write for Bulletin 76-Y on JOY Slushers and Bulletin 76-X on JOY Hoists.*

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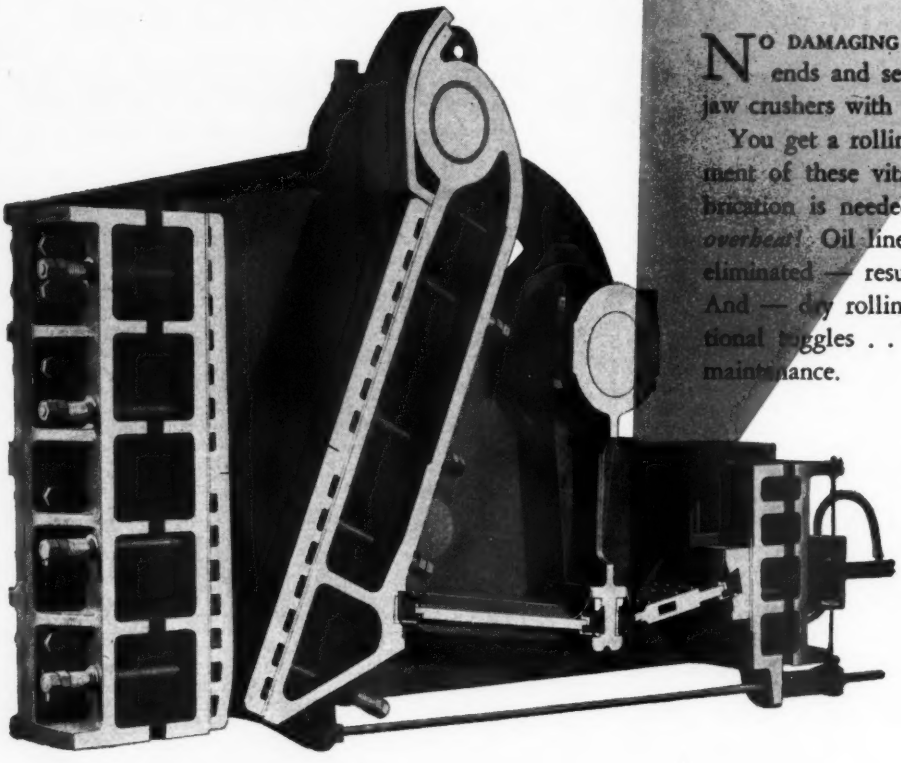

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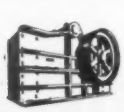

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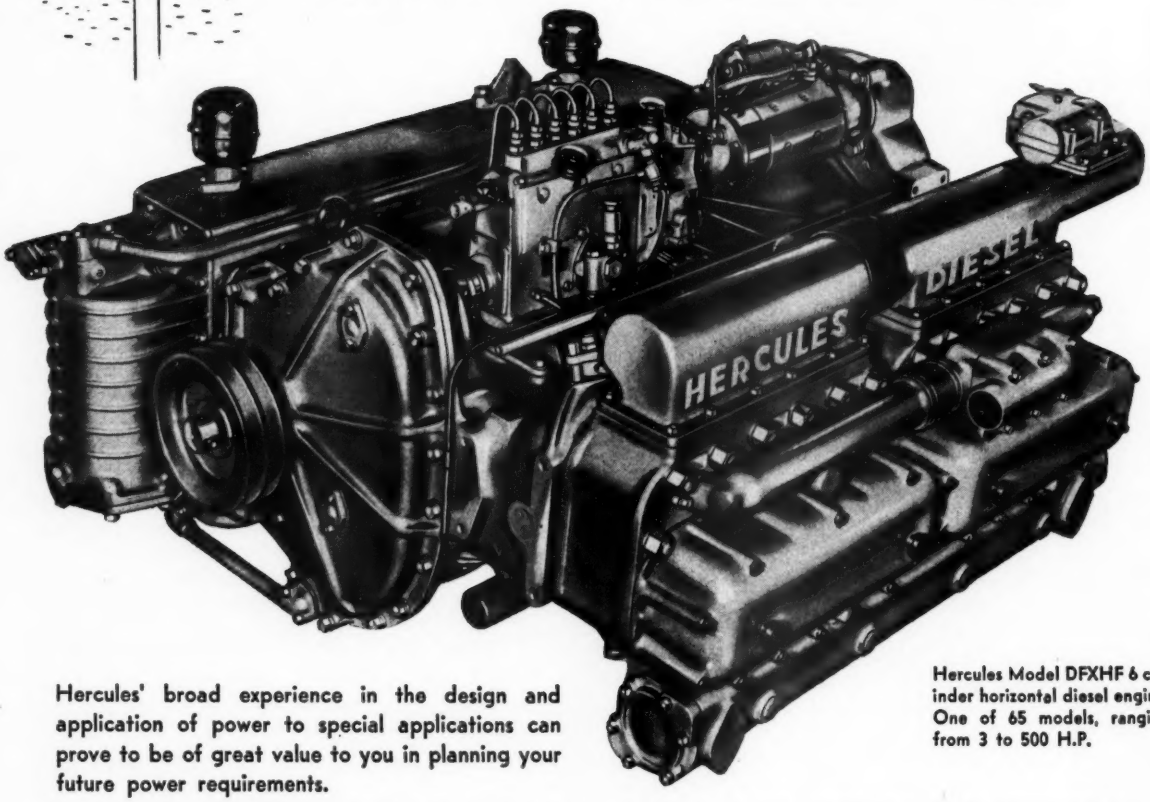


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July 23, 1952

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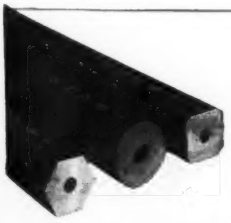

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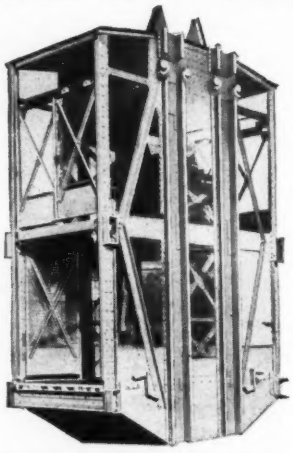

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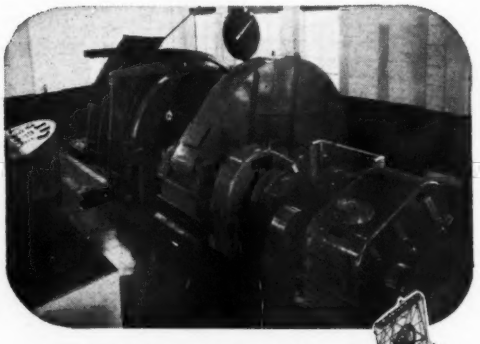

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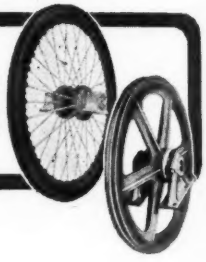

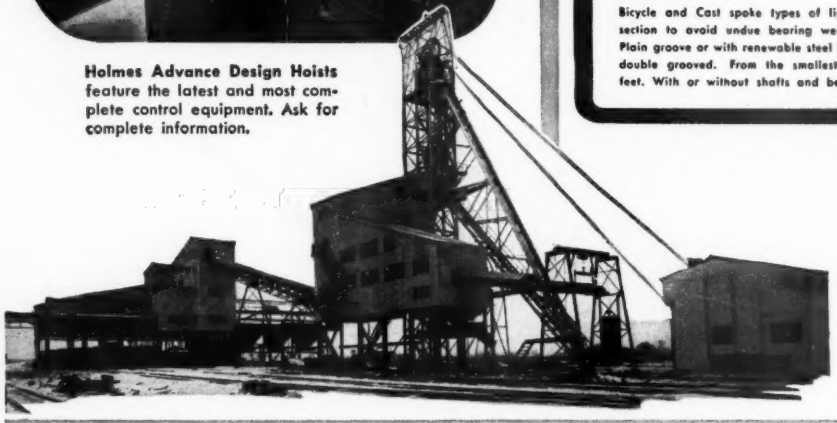

Peabody Coal Company's new mine No. 17 at Pana, Illinois, is equipped with Holmes Hoisting Equipment.

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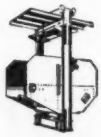

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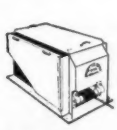

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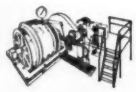

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# Editorials

JOHN C. FOX, *Editor*

AUGUST, 1952

## Aftermath

EFFECTS of the recently resolved work stoppage in the Steel Industry will be felt for many months to come. On June 1 of this year the nation's production of military, defense-supporting, and civilian items was fairly satisfactory, insofar as steel products were concerned. It was even possible to forecast relaxation of construction controls for the fourth quarter to permit the start of commercial and recreational projects prohibited until now. The situation in other segments of the civilian economy permitted an optimistic outlook for the first time since the defense program got under way.

Today the picture is tragically different. The loss in steel production from the longest work stoppage in history will amount to 20,000,000 ingot tons, more than double the loss resulting from the 40-day stoppage in the fall of 1949. This is equal to the entire yearly steel production of Great Britain and equivalent to the entire increase in annual output expected from the steel expansion program. In addition, halting of Great Lakes ore production during the strike will seriously hamper steel production during the forepart of next year—at which time only drastic emergency measures can keep up the rate of production until the Lakes are open for transportation. These measures—importation of foreign ore on a bigger scale, all rail shipments of domestic ores—can only result in higher production costs and will tie up cars urgently needed for coal shipment during the winter months.

Ore shortages will mean use of larger quantities of scrap iron and steel. This may mean the loss of all gains made in the intensive scrap recovery effort. Right now scrap inventories are at normal levels, but abnormal demands will wipe out the slim margin of safety attained.

In general, steel inventories prior to the work stoppage had reached a satisfactory level. Over half of these were used up during the time the mines, furnaces and steel mills lay idle. Not only that, but the entire stock of some critical shapes has been exhausted so that some users, even though they may have what appear to be ample stocks, will be forced to shut down until steel suppliers again catch up with demand. In the meantime many users of steel and steel products will be out of operation.

When the steel companies and the unions reached an agreement there were nearly a million and a half people out of work. Of this total 610,000 were steel and iron ore workers; 400,000 automobiles workers, 100,000 railroad men and 50,000 in captive coal mines, plus some 300,000 other industrial workers.

Due to varying lead times, of from 45 days on carbon steel to 90 days on other types, periods of unemployment are ahead for some of the 24,000 ordnance workers, 33,000 in metal furniture manufacturing, 37,000 iron and steel forging workers, 780,000 of those making cutlery, hand tools, hardware, etc., 1,275,000 in machinery manufacturing plants and 675,000 making electrical machinery. Another group to feel the pinch is the 1,880,000 in metal working and transportation equipment manufacturing industries. During the strike period steel workers alone suffered a total wage loss of $450,000,000—and this does not take into account the untold millions of income lost, and to be lost, by those thrown out of work in other industries.

Nor can the nation forgive the setting back of the defense program at a time when the President said a work stoppage would "immediately imperil our national defense and the defense of those joined with us in resisting aggression."

Every means will be taken to soften the blow but the cruel fact is that the period ahead will be one of slow recovery from the damage done by the 20,000,000-ton loss. Those tons of steel, those dollars vanished from pay envelopes can never be recovered. They are gone—and for what? Settlement on economic terms would have been possible several weeks earlier. At that time there was agreement on virtually the same wage increases and benefits as were settled on in the agreement reached on July 25. The roadblock to settlement has been the union's demand for compulsory membership which the steel companies in good conscience could not and did not grant.

John Mitchell's monument, as a great labor leader, is the eight-hour day. John L. Lewis will go down in labor history for the Miners' Welfare Fund. Philip Murray wanted to be remembered as the man who established the closed shop. Will he be remembered for that or for the hard times ahead for millions of workers inside and outside the steel industry?

After 11 years crosscuts in Butte granite were still as clean as day bolts were placed

# Rock Bolting Experience in The Butte Mines

## More Than Ten Years' Experience Proves Practicability of Bolts to Support Openings In Igneous Rock

By LLOYD POLLISH and ROBERT L. SANDVIG
Research Department
Anaconda Mining Co.

ROCK bolting was first undertaken in a crosscut in the quartz monzonite, or Butte granite, in 1939 and 1940 at the Belmont mine. A large cross-section was necessary, as this opening was and still is used for the passage of hot, humid, exhaust air to a nearby upcast air shaft. Timber would greatly restrict the air movement. The track is still as clean as the day when bolts were installed and all surfaces gunited.

At the present time, more than 1000 rock bolts are used in waste excavations each month.

### Theory of Rock Bolting

Rock or masonry can withstand tremendous compressive loads, but when the force is reversed, failure under a relatively light load is certain. On the other hand, steel builds our modern world because it holds together regardless of whether the load is compressive, tensile, shear, or impact. Steel bolts give to the rock the tensile strength that it lacks.

Surrounding every underground excavation, not far from its perimeter, is a natural, self-supporting rock structure; self-supporting because all of it is loaded in compression. However, on the perimeter of the excavation chemical action, blasting concussions, or rock pressure cause slabs or fragments of rock to fall away. Such sloughing action is dangerous, and is progressive until the opening is large enough to permit caving. Timber is put in to arrest that sloughing, not to hold up the rock.

However, from 22 to 37 percent more rock must be removed than the cross-section requires in order to accommodate timber. So the purpose of rock bolting at Butte is to make possible the excavation of a minimum size cross-section and secure the perimeter, or sloughing zone, by binding it to the naturally self-supporting rock structure surrounding it. Further, well placed rock bolts lock individual loose rocks into a self-supporting arch and permit securing the rock as it stands without additional work.

The masonry arch theory is applicable anywhere, although in stratified rock, the competent beam theory is applied. If a number of one-in. boards were piled one on the other across a 10-ft span, they would sag considerably in the middle. But if they were bolted tightly together, the sag would hardly be appreciable. In fact, the pliable boards or roof strata would then be a compent beam capable of supporting an additional load.

Unfortunately, Butte granite does not always slough in boulder sizes, but often is so fissured that it comes loose like a pile of bricks. In such cases, light timber supported by the bolt has been very successful in distributing the strength of the bolt over larger areas without intruding into the necessary opening. In general, any excavation surrounded by a competent rock structure, firm enough to anchor a wedge type bolt, can be secured with rock bolts.

Percolating water and post mineral

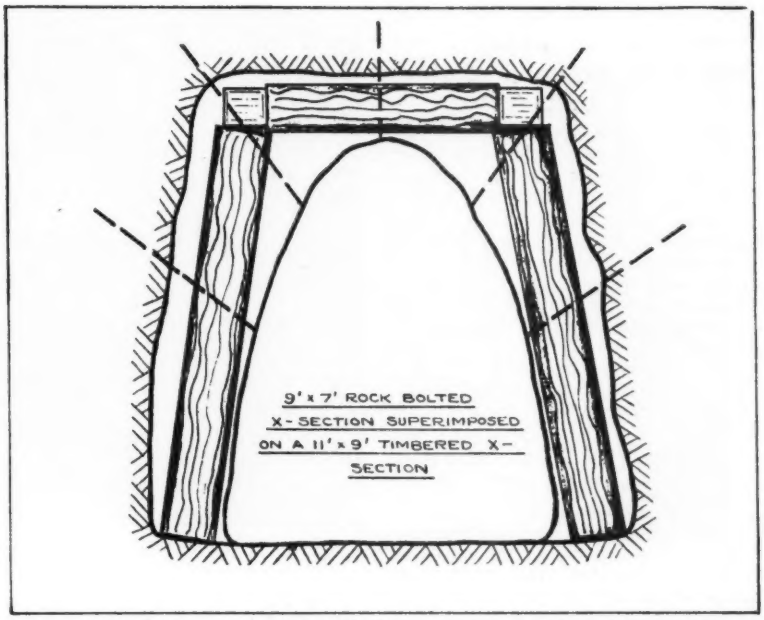
faulting have altered the properties of the Butte granite so extensively that every place where rock bolts are needed presents a different installation problem. Where weak structure is apparent, one or two bolts may suffice, but the best practice is to bolt the rock before it ever has a chance to loosen—12 to 18 in. from the face. Since timber blocking is in a fixed pattern, rock bolts placed in a similar pattern can be relied upon. However, rock bolting is flexible and can be applied in a multitude of ways, while timber is rigidly bound to the shape of the sets.

## Rock Bolting Practices

Miners tightening a steel plate against the rock with an impact wrench usually put a strain of about 10 tons on the bolt. When the plate bears on a smooth rock surface, support is assured, but on irregular surfaces, the rock points in contact with the plate often crumble and release the pressure which binds the loose rocks together.

Wood, bearing against an irregular rock surface, has the advantage of yielding to the rock points without relaxing the pressure against the rock surface. Further, it affords an inexpensive means of applying pressure to a larger area, securing all loose rock and binding the entire periphery into a competent masonry structure.

The purpose of stringers is to distribute the strength of the bolts over a greater area than in the case of a single headboard. Further, a stringer spanned between two bolts is a simple beam, stronger than the cantilever headboards. Scrap rails and shaft guides serve very well as stringers.




**For equal effective cross section bolted opening requires 22 to 37 percent less excavation than timbered drift**

Caps, five by ten in., have proven very worthwhile in laterals or waste drifts where the walls are strong and the back loose. Safety stringers are extended ahead of the last cap to protect the men when they drill bolt holes for the next cap. Back lagging and cribbing are then placed over the caps. They are easy and safe to install. Often only one side of a crosscut needs support.

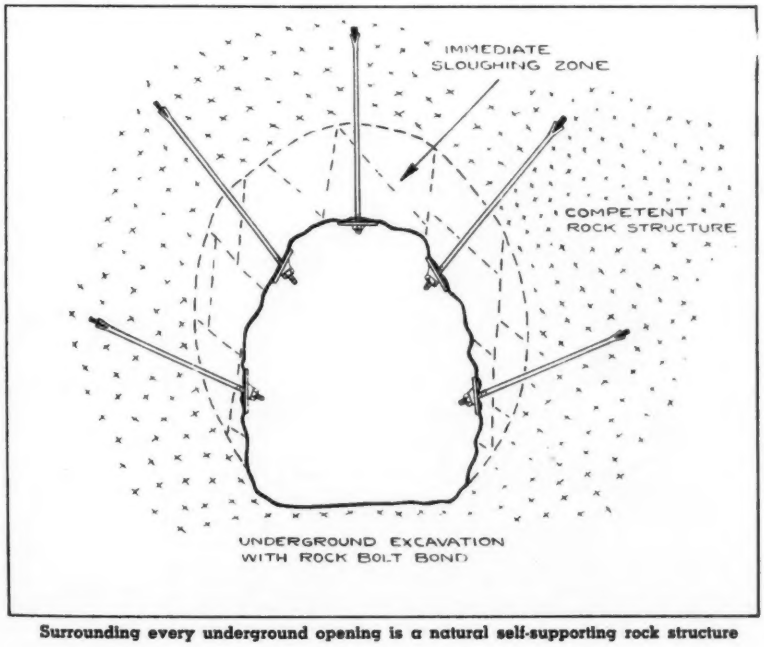
In one section a rock bolt patch was put in over a wide, decomposed granite and clay seam at the Emma mine. Although originally gunited, the gunite did not prevent the clay from swelling, and in time, the clay structure eroded as much as five ft back from the original wall. The rock bolts used in patching were anchored in the adjacent solid rack, while the four by 10-in. caps were lagged over and drawn in tight against the clay surface.

Rock bolt sets made of light timber have found favor for repair work in main haulageways that were not bolted or timbered originally. They can be put in without interrupting train service, without molesting the pipe lines, and without enlarging to make room for timber.

These sets were installed in 600 ft of haulageway connecting the Badger and Black Rock mines. Recently, when the air flow was reversed from fresh to exhaust air, the hitherto firm granite became decomposed and sloughed badly. Two men can install two sets per shift in spite of interruption by trains. Safety stringers served to make drilling bolt holes safe.

An emergency crosscut driven to connect the Leonard and East Colusa mines passes through a rhyolite dike. It has since been made the main haulageway to the Leonard shaft on the 3200 level. A rather costly, elaborate rock bolting installation was made, but experience in rhyolite has taught that timber sets usually have to be changed annually. After a year, not a single fragment of rhyolite had come loose.

Rail sets were experimented with because they can be forged to any shape of cross-section. Further, blasting close to them does no harm. They




**Surrounding every underground opening is a natural self-supporting rock structure**

are easy to install and very permanent.

## Other Applications of Rock Bolts

The previous discussion on rock bolts has dealt with the substitution of rock bolts for timber in waste excavations. Various other applications of rock bolts are constantly being inaugurated in the Butte mines by the operating department, and many of these have met with great success. In addition, a long range program has been planned to adapt rock bolting to other phases of mining. As new methods are tested and proven, they will become standard operating procedure.

## Rock Bolting Prior to Concreting

In one instance a crosscut was enlarged to make room for a thick concrete lining capable of withstanding a possible head of 2000 ft of slime pulp which will fill the worked out mining zone above it. Badly fractured, mineralized, and permeated with copper sulphate solution, the ground was successfully supported with rock bolts and war surplus airfield landing mats for several months until the concrete lining was poured. Bolts, wedges, plates, and mats were sprayed with a rubberized coating to preserve them from the copper water corrosion.

An inclined rope raise connecting an underground hoist room to the Mt. Con shaft was pattern bolted and gunited instead of being concrete lined, reducing the amount of waste excavated by 38 percent and saving about 250 cu yd of concrete.

The hoist room itself is entirely concrete lined to inside dimensions of 50 by 30 by 20 ft. Six and eight-ft bolts were used to support the back and walls as excavation progressed and until the lining was poured. The protruding ends of the bolts reinforced the roof slab and were useful in hanging the reinforcing rods.

Another example is a concrete lined service tunnel leading from the mine yard to the Kelley Shaft. Being only 35 ft below the surface, the rock is blocky and decomposed. When the tunnel was driven, regular timber sets were used for support, but in order to place the forms, the timber had to be removed. Bolts and headboards installed before timber removal made it safe for placing prefabricated forms and reinforcing rods.

One method of holing a raise into a timbered drift utilizes 16 ft 5 in. by 10 in. stringers, bolted to the foot and hanging walls with 8-ft rock bolts. Lagging which bears on the stringers is spiked to the posts to prevent the sets from falling into the raise when the holing blast is made.

**After a year not a single rhyolite slab had come loose in zone supported by light sets bolted in place**

Rigid, spiral welded, steel vent tubing was installed in a tunnel and connected with a reversible fan. Four by five-in. cross bars, supported by rock bolts, were used in untimbered sections to suspend the rigid vent tubing, pipe lines, and cable. In the future, they will be used to suspend a trollery line.

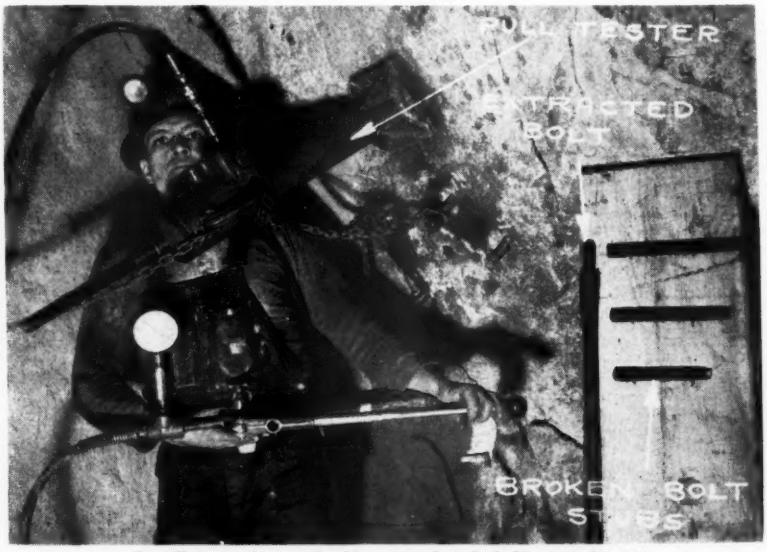
## Rock Bolting Equipment

A one-in. diam slot and wedge type bolt is standard in the Butte mines. Slots may be flame cut, sawed, or forged. Anchorage is accomplished by driving the slotted end of the bolt onto a steel wedge with a stoper. As the bolt advances onto the wedge, the prongs engage the side of the hole and effect a secure anchorage. Twelve in. of thread on the other end allows ample room to hang stringers or light timber when conditions require. Drilling the holes and driving the bolts is done with pneumatic rock drills, usually stopers. Rock bolt hole are bottomed with a 1¼ in. Liddicoat bit.

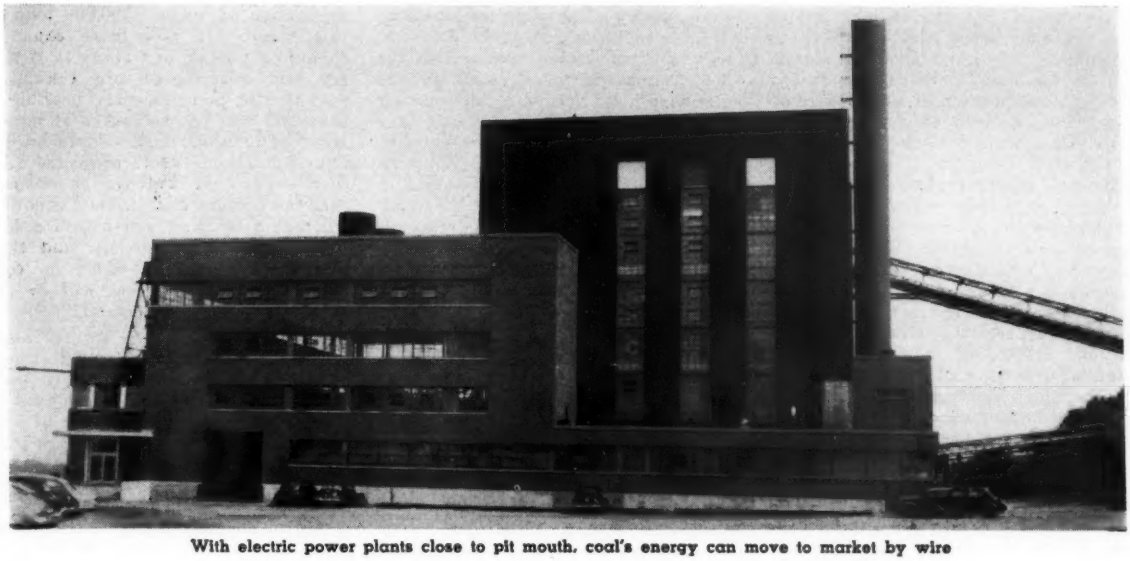
Expansion shields with rock bolts are being used as hangers for pipe, vent tubing, and slusher sheave blocks because they are recoverable.

A driving tool to be used with a stoper has been developed. It is simple in design, flexible in use, and inexpensive to manufacture. Standard drill steel of any length necessary to reach the driving position is inserted in the chuck of the stoper and rotates in the cylinder at the bottom end of the driving tool. A hardened insert at the bottom of that cylinder is neces-

*(Continued on page 123)*



**A pull tester is a valuable part of rock bolting equipment**



With electric power plants close to pit mouth, coal's energy can move to market by wire

# New Developments For Coal Utilization

## By Making Most of Its Opportunities the Coal Industry Will Find Vast New Markets

By JOSEPH PURSGLOVE, JR.
Vice-President, Research and Development
Pittsburgh Consolidation Coal Co.

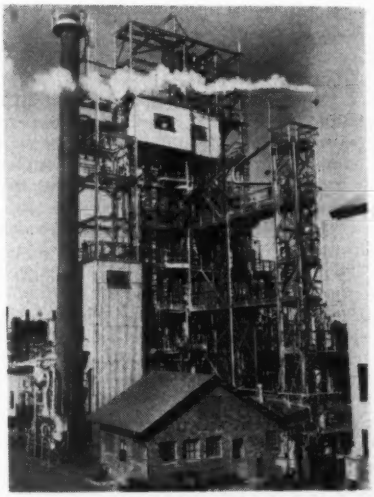
SEVERAL times recently I've thought of the stories my father used to tell of the coal industry on the Monongahela River in 1892. At that time the only outlet for coal was by river shipment because no railroads had yet been built into the area. Many of the barges used in transporting the coal were constructed of green lumber cut from local hardwood forests. They were loaded with coal and shipped down river as far south as New Orleans, where the coal was removed and the barges dismantled to salvage the lumber for local sale.

The market at that time was on a "coarse-coal" basis *exclusively*. Coal below about one in. was considered just plain, useless dirt; the miners were paid for *only* the plus-one in. size they loaded into mine ears, and the customers bought *only* plus-one in. One of my father's first jobs was to see that the coal skiffs placed on the river under the bar screens of the tipple were always rowed to the middle of the river and dumped when full of one-in. coal. This dumped coal was of the highest metallurgical quality ever produced in the U. S. A., and today's best coking practice suggests that all coal fed into modern coke ovens should be crushed to minus ¼ in. This early-day waste is something to give us a turn when considered in the light of the presently limited metallurgical coal reserves in the Pittsburgh district.

Coal was then sold by the bushel, and to arrive at a mutually satisfactory price the mine owner stood on the edge of his river tipple exchanging arm signals, hand signs and wig-wags with the steamboat captain-owner, who usually stood on the pilot house of his vessel in the middle of the river. After a few minutes of haggling, if they had not come to terms on the price, the steamboat would push the empty barges on up the river and the captain would repeat the wrangling gyrations opposite the next mine tipple. If the steamboat owner had not been able to place all his empty barges at his price after passing the last upriver tipple, he would return and, relenting, make a deal at a slightly higher price and leave his last empties. The mine would then start operations to fill the barges, even if it were late in the afternoon. I wonder sometimes if our planning today in the coal industry is basically very much longer range; if in some ways we are not still standing on a dock and gesticulating when we should be moving with the current buoyed up with new concepts instead of bucking the current as the tide floods.

### Market Demand for BTU

One very definite trend in our present business, and it will become more pronounced in our future, should be clear to all of us: while my grandfather had no customers for coal finer



New concepts and methods for converting coal into liquid fuels could provide an additional 180,000,000-ton a year market

than one-in., we are rapidly coming to the time when we will have no customers of great national significance for coal coarser than one-in. It is just a question of time before *all* coal must be sold on a heat-unit or analytical basis. When this time arrives, it will completely alter all past concepts of how coal sizes affect coal mining and coal selling economics. Our growing customers are those that ignore coal sizes; they are the users that buy and consume only units of energy in solid form. Into this classification fall the electric utility industry and the steam generating stations of our expanding industrial system. Special uses for coal are growing, too, in the steel, electrometallurgical and chemical industries. Here again there is no particular premium for the size of the coal purchased. In almost all cases the coal is crushed fine before it is used, and is purchased for its chemical qualities only. These two general categories of our future coal customers are growing. All the others are shrinking: railroad fuel, the smaller handfired industrial and commercial customers, and the domestic household user.

Any realistic examination into the future of coal must take into account this striking growth in the numbers of coal customers that want only heat units or chemical properties regardless of coal sizes. Among other things, we should ask ourselves whether this change in demand as to sizes calls for some drastic reshaping of our thinking as it relates to production and pricing policies. The decisions we reach on such points may well shape our ability to sell, at destination, heat units at a price below that of competing fuels. The tide is very definitely turning and may sweep us hard aground in the shallows if we do not move boldly into the open sea on which we are now afloat.

## Cheaper Transportation Needed

There are five great possibilities that could offset our large tonnage losses of the recent past and perhaps increase the overall demand for coal beyond any past records. The first and rather obvious possibility is to expand our markets under large boilers by replacing the oil and gas now being used there. This can only be done on a long-term basis by reducing our delivered cost of heat units at these boiler locations. We must continue to do everything possible to reduce the mine-mouth cost of coal, and from here on out we must begin to utilize all possible cheaper forms of transporting coal from the mine-mouth to our markets.

In view of recent additional railroad freight rate increases, we should carefully study all possible methods of getting coal to market by trucks, by river, by conveyors, by aerial tramways, and by all possible combinations of these methods. We should review with electric power companies, the idea of making more power at the mine-mouth, or close to it, and moving the power to market via wires rather than in railroad cars. If development work is necessary to prove up some of these different methods, it should be undertaken without delay and with the fullest cooperation of the coal industry.

In Pittsburgh Consolidation Coal we have high hopes that the pipeline method of transportation can be integrated into combinations of these different methods in order to give coal a new competitive advantage not now possible. Here again it should be pointed out that pipeline development points in the direction of fine-size coal. As a matter of fact, studies show that it is impractical to consider pumping coarse coal through long pipelines. Thus, it is just a question of cost per million heat units. It is demonstrably clear that the cost of moving coal to market by rail is ever increasing while at the same time the cost of moving gas and oil to market through the use of newly developed techniques is decreasing. Coal must, and will, find a way out of this dilemma. Coal placed under boilers now using gas and oil where coal is available, could increase coal's markets by 30 to 60,000,000 tons a year.

## Increased Electric Power

A second way of greatly increasing our markets is by promoting the development of methods of producing and distributing electricity from coal more cheaply. The electric power industry is expanding very rapidly, but we might stimulate that expansion and help make it even more rapid and far reaching if kilowatt-hours could be sold more cheaply. Many possibilities suggest themselves, for transporting kwh's instead of coal from mine to market, and it is the real obligation of the coal and electrical industries to explore them all actively. It has been stated that if electrical energy could be sold for 20 percent less, its use would double in the U. S. A. If this were an accomplished fact, we could have had a present-year utility market of 220,000,000 tons instead of 110,000,000 tons, and a projected 1960 market of 200,000,000 tons *more* than that now estimated for large power plants.

The prospects in the comparatively early future for expanded electrical energy uses are virtually endless. If we gear our business into this opportunity with effectiveness, there is no telling how far we might go. Here are a few of these important practical opportunities. Let us look at the cycle of expansion in aluminum capacity as one example. When the present cycle has been completed, the nation will have plants for a yearly production of about 1,500,000 tons of this metal. If still more capacity should be needed, and many in industry and government are convinced that it will, there is every possibility that coal will be the source of power required to produce it. There are no figures available as to projected further expansions but let us assume that the present and planned capacity will again be expanded within a few years by just 10 percent, and that this increase will be based on coal power. How much coal will be required to meet this demand?

It now takes about 9 kwh of electric energy to produce a pound of aluminum. Optimum efficiency in generating power from coal at the present time requires about 0.7 pounds of coal to produce a kilowatt-hour. The production of each pound of aluminum would thus require a minimum of 6.3 lb coal. Using these figures as a measure, an increase in the national production of aluminum by 10 percent or 150,000 tons, would provide a market opportunity for coal of some 950,000 tons annually. If, as we believe it might, carbonization is employed ahead of the power station, the annual tonnage here would jump to about 1,330,000 tons.

While this is hardly an astronomical figure to an industry used to dealing in millions of tons, it represents an application that has a pivotal importance for the future. If aluminum some day expands to four or five million tons per year—and most of the new capacity is based on coal-generated power—it could consume very significant quantities of coal annually. There is also magnesium production which requires considerably more power than aluminum. Now being considered for titanium production is a process that would consume about four times as much electric power as that needed in producing aluminum. Other promising new market opportunities for the use of coal-based electric power include the making of more chlorine, sodium and phosphorus.

Moving away from industry for a moment, there is on the horizon the dream of wide-spread electric home heating, the ultimate in automatic convenience, control and safety. The development of the heat-pump principle has moved this dream much closer to materialization. Although capital costs are presently rather high and some technical problems need to be solved, more applications of the heat-pump in combination with air-conditioning will be made in the near future. The first general applications will probably be in multiple dwellings and commercial buildings. Here again the basic cost of the electric energy units is the important factor in the ultimate success of this development. For this reason the

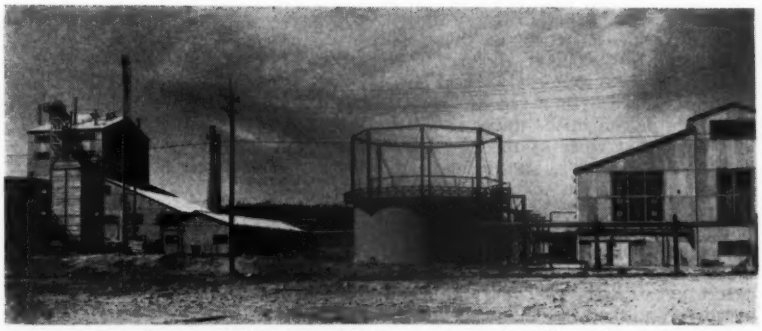
question of how the coal industry can assist the power companies to produce cheaper electric power is a matter of prime concern.

Frequently we are asked when discussing this potential growth in electric energy demand, whether the growth will not be counter-balanced by greater efficiency so far as the market for greater coal tonnages is concerned. Frankly I don't think so. This business of converting more and more power from a pound of coal has been going on for a long time. Meanwhile, electric utility fuel markets keep increasing. This means, and I feel it is important to emphasize the point, that improved efficiency in the burning of coal creates far more coal demand than it displaces.

## Gas and Oil From Coal

The third prospect for new coal markets is in supplementing natural gas sources with gas made from coal. New processes and techniques now being developed must reach the commercial stage before this market becomes a reality. The possibilities are enormous, and the technical potentialities are most promising. If the coal industry in 1960 should be required to supply only about 10 percent of the country's needs for gas, the necessary conversion plants would consume around 100,000,000 tons of coal a year.

The fourth and quite possibly the largest market opportunity for coal over the long pull is the conversion of coal into liquid fuels. This has been done in Germany and England for years. Liquid fuels thus produced are not presently competitive in this country with those from natural sources. The older coal conversion processes such as the direct hydrogenation of coal have been abandoned in all of western Europe and in England because they are no longer practical even in this area where no natural petroleum exists to any extent.



Gas produced from coal by processes not yet commercial will supplement natural gas sources

Further research leading to new concepts and processes will be required before the economic conversion of coal into liquid fuels can become a reality. There is more than a little promise here, however, and signs certainly indicate that this development is not simply an idle hope. There is ample evidence at hand that it will become economically feasible by 1960. If and when this hurdle is cleared what does it offer in the way of a promise for the coal industry? Let us assume that by 1960 the demand for liquid fuels will be such that only 10 percent of that demand will be produced from coal. The requirements would be about 180,000,000 tons of coal a year.

## Carbonization Plus

In addition to these four basic avenues to increased future coal markets, there is a fifth development that connects up with all four, while at the same time developing opportunities in the chemical market. This interim approach is involved in our company's research and development on the partial conversion of coal through a new form of low-temperature carbonization. Our idea here is to dove-tail this development of coal processing with our overall objectives by advancing in the near future on all four of the fronts I have discussed.

In this process we squeeze out some special values from the volatile elements such as chemicals and gas and can still produce a more economical solid fuel that will be suited for firing under boilers. A portion of the distilled liquids not directly usable as chemicals could be converted into more chemicals, and when markets warrant it into liquid fuels. There is flexibility in this approach, since changes in the demand could be met at least partially, by changing the yields through process variations. Such a process will first be used to produce chemical intermediates from the distilled tar products. At a later stage in the evolution of coal-based synthetics, the demand-price picture will permit the conversion of some of these tar products into synthetic liquid fuels. As a larger demand for gaseous and liquid fuels develops, it could be accommodated by the gasification of the solid char produced and not used under boilers, as well as by using other processes yet to be developed for the complete conversion of coal. I believe that this step-by-step approach toward complete coal conversion will bypass many of the difficulties and certainly ease the capital requirements that would be involved if we pushed the now outmoded European processes for the complete conversion of coal.

Coal pipelines can provide cheap transportation

Many good articles have been published lately about the future energy requirements of the United States. A lot is also being printed about future uses of atomic energy that will make electricity so simply and inexpensively. If you are worried about this, I commend to you the following story.

"A Martian space ship lost its bearings and landed by mistake on our planet. Their time here was limited because their fuel was expending itself, so they asked to be shown only our method of providing energy for our people before they had to take off for Mars. When they returned

home, the other Martians were naturally interested in their fleeting impressions of the planet Earth. The leader of the group said these inhabitants of Earth were the most fortunate people in the universe. He told them that whereas the Martians had had to develop and to depend upon nuclear fission to provide their sources of energy, these very lucky Earth-people simply dug holes in their planet and brought to the surface chunks of black stuff containing a high percentage of carbon. The Earth people merely pushed this material under boilers where it readily burned, releasing heat and making steam that drove turbines that drove generators that made electricity, just like that!"

## Coal's Future Summed Up

Five possibilities for expanding coal's markets in the future are:

1) By reducing the mine cost of coal and by finding cheaper forms of transportation, at least 30,000,000 of tons of coal a year can replace oil and gas under boilers.

2) By doing everything possible to help electric utilities reduce the cost of power to their customers, we could pick up at least another 100,000,000 tons a year more than called for by present utility expansion plans.

3) By developing and promoting methods of converting coal into a natural gas equivalent, coal could have a market for at least 100,000,000 tons a year at gasification plants.

4) By developing and promoting new concepts and methods for converting coal into liquid fuels, coal could have a market of 180,000,000 tons a year in synthetic fuel plants.

5) By using a new form of low-temperature carbonization the coal industry could soon begin to accomplish on a partial basis the objectives as set out under (1), (2), (3), and (4) and be moving step-wise in the right direction.

It is not possible to predict how the coal industry will meet the issues and problems projected here. But delays in approaching the issues realistically can be a misfortune. Perhaps the great Bard had more than his immediate cast of characters in mind when he had Brutus say:

"There is a tide in the affairs of men,
Which taken at the flood, leads on to fortune;
Omitted, all the voyage of their life
Is bound in shallows and in miseries.
On such a full sea are we now afloat;
And we must take the current when it serves,
Or lose our ventures."

**The gas turbine opens a new field for coal utilization**

**Expanding demands for electric power are being met by the development of high combustion efficiencies in modern coal burning techniques**

*Welcome to*

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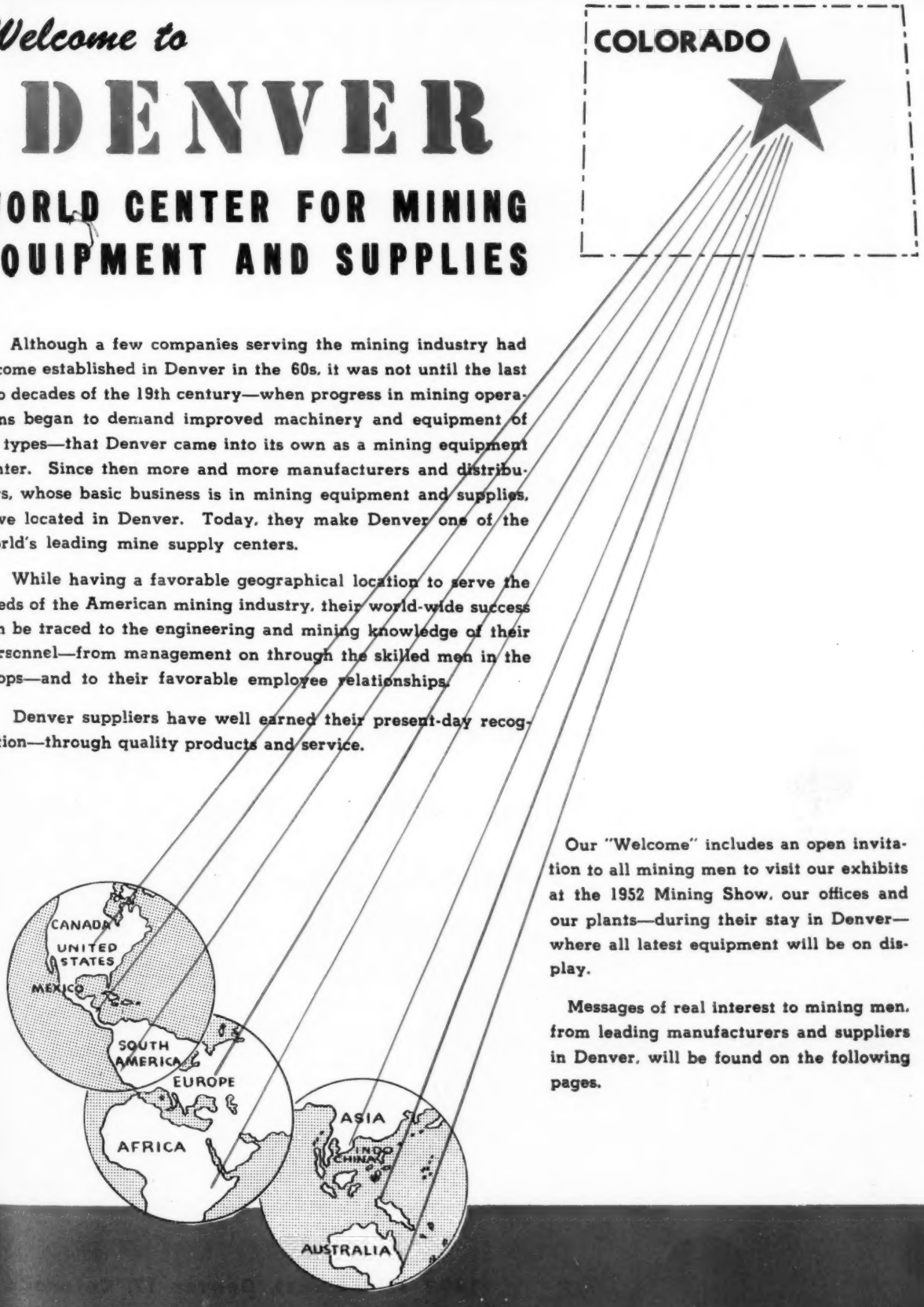
## WORLD CENTER FOR MINING EQUIPMENT AND SUPPLIES




Although a few companies serving the mining industry had become established in Denver in the 60s, it was not until the last two decades of the 19th century—when progress in mining operations began to demand improved machinery and equipment of all types—that Denver came into its own as a mining equipment center. Since then more and more manufacturers and distributors, whose basic business is in mining equipment and supplies, have located in Denver. Today, they make Denver one of the world's leading mine supply centers.

While having a favorable geographical location to serve the needs of the American mining industry, their world-wide success can be traced to the engineering and mining knowledge of their personnel—from management on through the skilled men in the shops—and to their favorable employee relationships.

Denver suppliers have well earned their present-day recognition—through quality products and service.

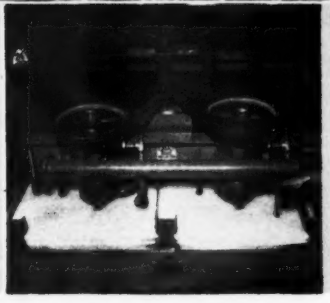
Our "Welcome" includes an open invitation to all mining men to visit our exhibits at the 1952 Mining Show, our offices and our plants—during their stay in Denver—where all latest equipment will be on display.

Messages of real interest to mining men, from leading manufacturers and suppliers in Denver, will be found on the following pages.

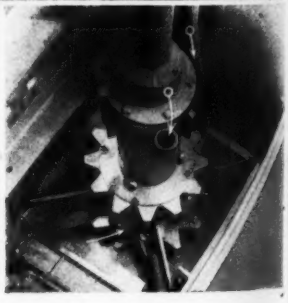
# ...LINGS yesterday
## ...because of ... price of metal.

## New Denver "Sub-A" Super Rougher Flotation Machine in roughing circuits aids in getting values which are now profitable with higher prices!

**The Denver "Sub-A" Super Rougher Flotation Machine** features a low pulp level, adjustable froth depth and double overflow so froth may be quickly discharged before bubbles drop their load. Photo shows a 2-cell, No. 18 Sp. (32x32) Denver "Sub-A" Super Rougher Flotation Machine, filled with water. Depth of water is 18". Intense agitation and aeration raises froth to 26", a deep froth of 8"



**Controlled feed** to the agitation chambers add to the flexibility of the unit. Feed to agitating chamber is regulated by rubber bushing to meet ideal flotation conditions. An adjustable sand relief opening is placed low in the cell. Pulp level is adjusted by a handwheel weir gate at the end of every two cells. This is a double impeller mechanism.



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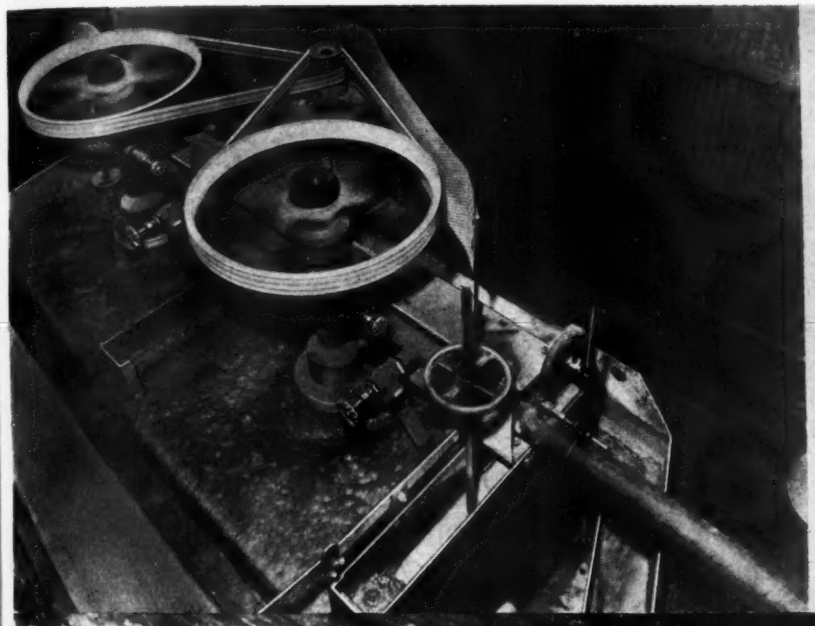
## Here's the *New* Denver "Sub-A" Super Rougher Flotation Machine to recover more values . . .



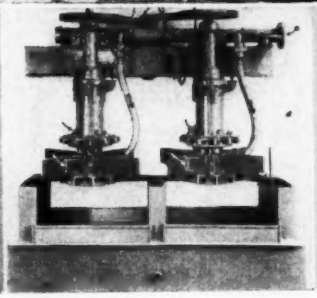
Here is a flexible Flotation Machine that gives intense aeration and short-distance froth overflow, so important on extremely low-grade ores and coarse-grind feed. As a scavenger machine at the tail end of a circuit, the unit increases your mill efficiency by lowering tailings losses.

Featuring a low pulp level, this NEW Denver "Sub-A" Super Rougher Flotation Machine offers controlled aeration, intense agitation, and regulated feed. These are the flexible tools your flotation engineer needs to get results that pay greater profits.

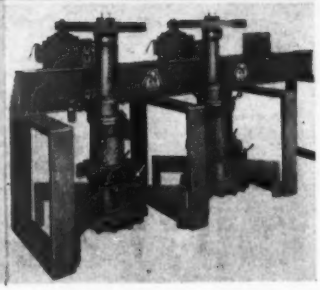
The world's leader in flotation engineering, Denver Equipment Company adds the Denver "Sub-A" Super Rougher Flotation Machine to its long list of continuous flotation machine improvements. You can buy all of your ore dressing equipment from DECO, you get everything from testing to dryer from one company, one responsibility, without a premium.

Find out how you can get more PROFIT out of your ore with a Denver "Sub-A" Super Rougher Flotation Machine. Phone, write or wire today!

**For simplified repair,** the entire assembly may be removed easily. All wearing parts are standard and interchangeable with other Denver "Sub-A" machines. Single or double impeller mechanisms provide maximum aeration and are furnished to meet your specific recovery and frothing objectives.



**Conversion units** are built for most makes of flotation tanks. You get the same mechanisms that are standard on the new Denver "Sub-A" Scavenger Machine. This gives you the advantages of standard, reliable DECO service and efficiency. More Denver "Sub-A" Flotation Machines are used for roughing and cleaning than all other makes combined. Find out how you can profit by converting to Denver "Sub-A."



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GRAHAM HUNTER

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C'MON OVER TO THE CF&I BOOTH, GEORGE. THEY'VE GOT A SWELL 'PHONE SERVICE THERE!
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IS THAT A MIRAGE, OR DO I SEE A WATER COOLER?
IT'S WATER, BROTHER! CF&I THINKS OF EVERYTHING!
THIS BOOTH IS A GOOD PLACE TO MEET! YOU CAN LOOK AT THE CF&I DISPLAYS IF YOU HAVE TO WAIT
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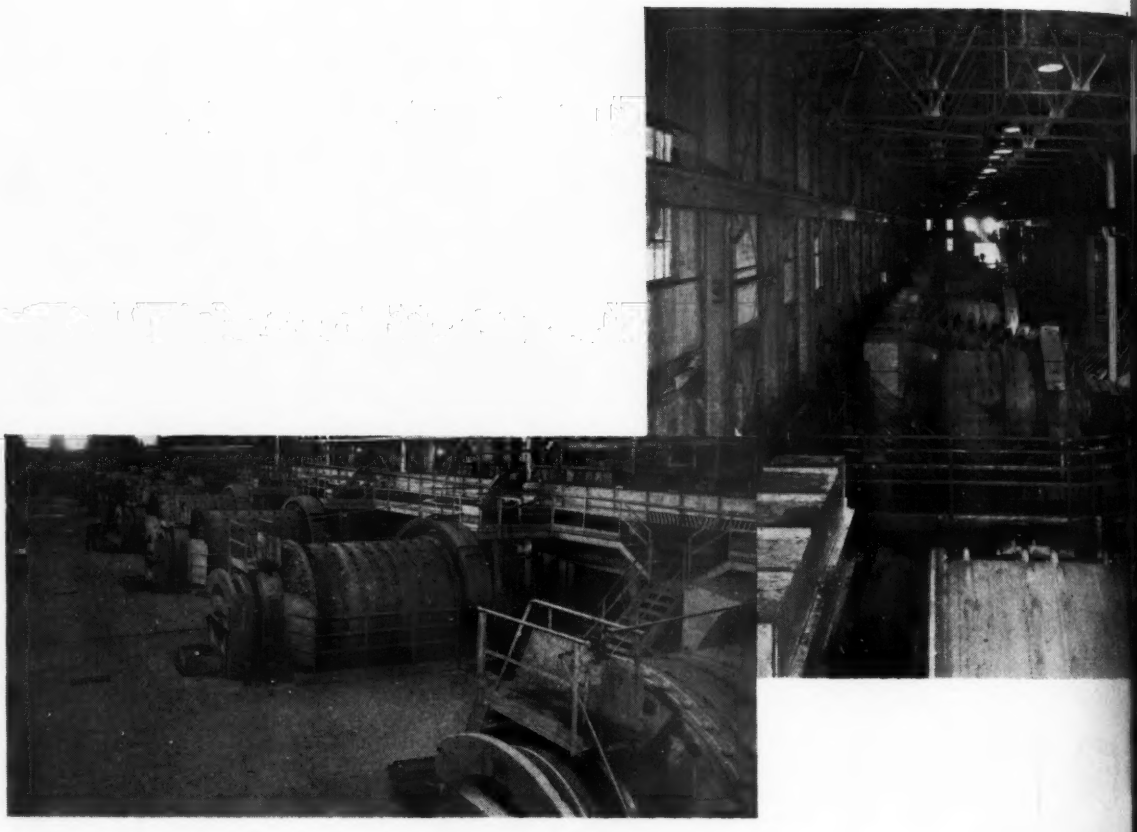
# a Cost-cutting

## • MARCY MILLS •



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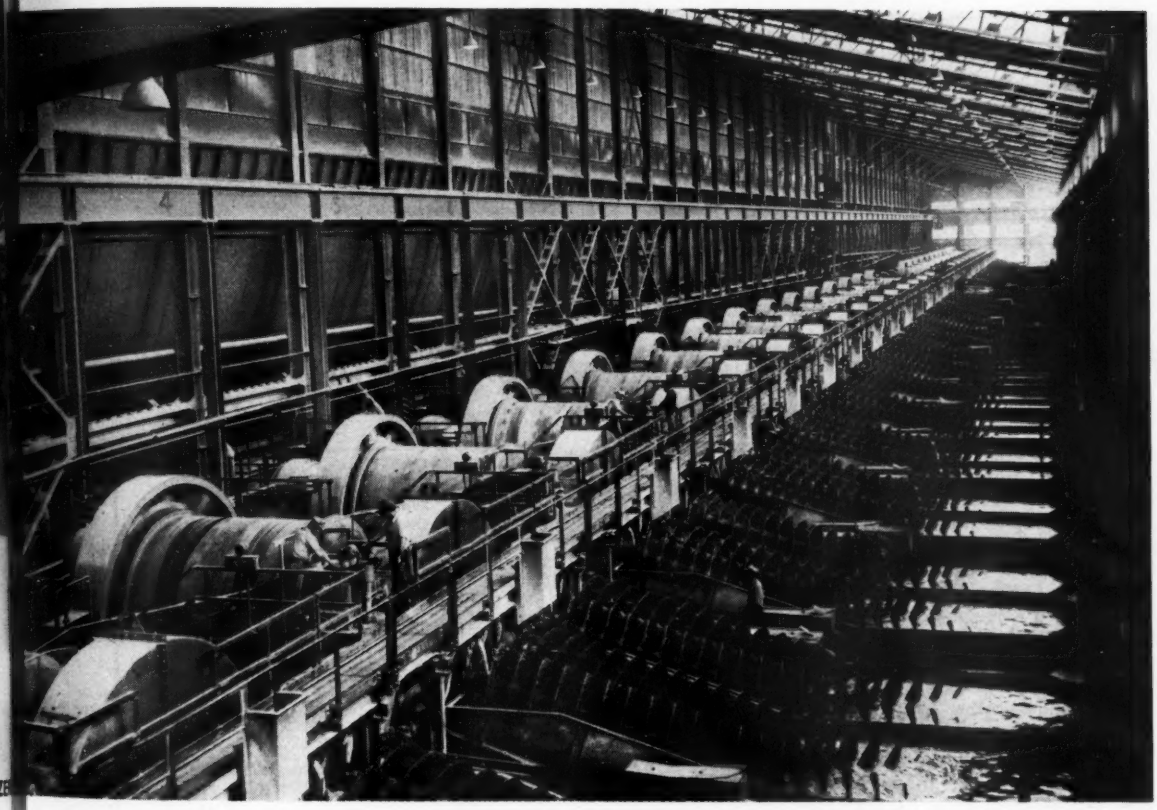

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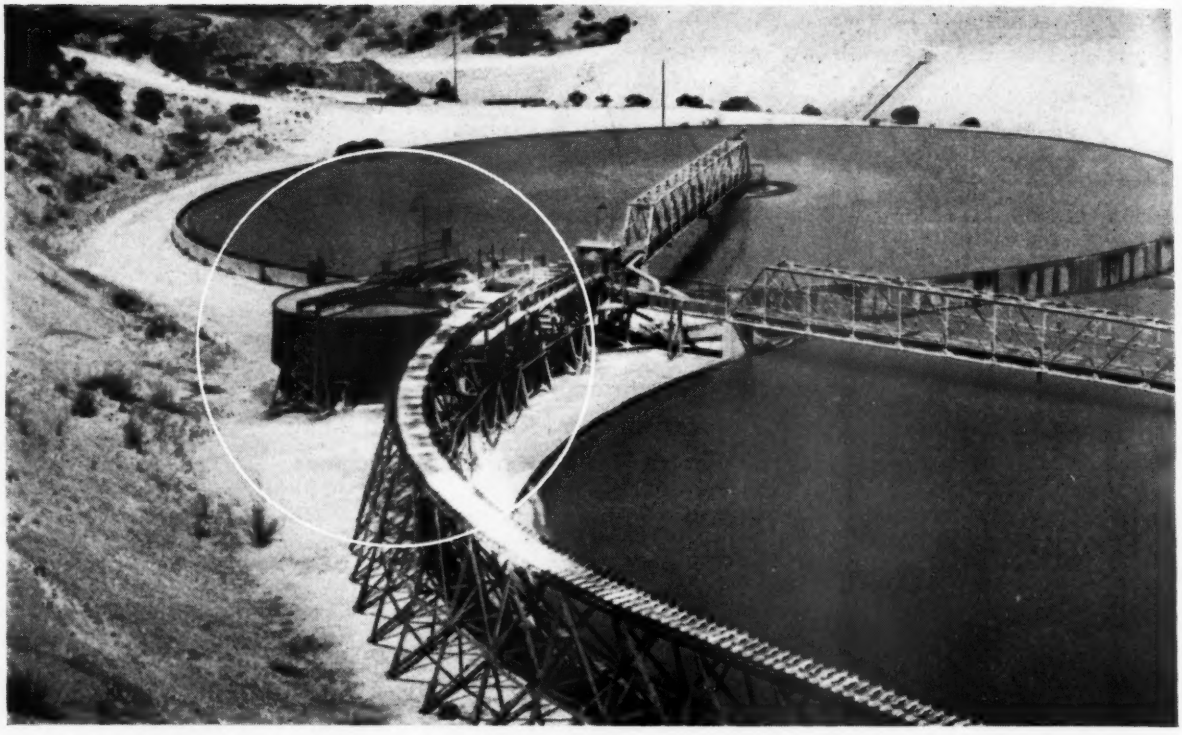


# Smooth out your tailings operations

## *in spite of increased tonnage . . . changing ore characteristics*

Here is how one operator solved the problem of increased tonnage and changing ore characteristics . . . with a Dorr Hydroseparator.

To handle a total of 12,000 tpd of copper flotation tailings at 26% solids, the initial installation included two Dorr Torq* Thickeners, each 225 ft. dia. When variables in ore characteristics reduced thickener capacity and increased water loss in the underflow, a Dorr Hydroseparator was installed ahead of the thickeners to compensate for shock loads. The Hydroseparator installation, resulting in better thickener performance, did two things:

1. Mill output *increased* by an average of 1,000 tons per working day.
2. The amount of water lost in thickener underflow *decreased* by 166 gpm.

The Summary of Operating Data shown here gives additional information, before and after the installation of the Dorr Hydroseparator.

To solve your tailings thickening problems, make use of our diversified experience in the field of metallurgical production. Let us know about your problems and we will work to solve them with you. THE DORR COMPANY, Barry Place, Stamford, Conn.

**Dorr Hydroseparator**
**Summary of Operating Data**
**Castle Dome Copper Co., Miami, Arizona**

| Year | Feed to System Avg. Tons Per Day | Character of Feed | Percent Solids Combined Underflow |
|---|---|---|---|
| | **WITHOUT HYDROSEPARATOR** | | |
| 1948 (Jan.-June) | 10,406 | Hard Ore | 44.5 |
| Dorr Hydroseparator Installed July 1948 | | | |
| | **WITH HYDROSEPARATOR** | | |
| 1948 (Aug.-Dec.) | 11,436 | Hard Ore | 45.2 |
| 1949 | 11,814 | Variable Ore | 46.4 |
| 1950 | 11,905 | Variable Ore | 47.8 |
| 1951 | 12,076 | Variable Ore | 47.9 |


Better tools TODAY to meet tomorrow's demand

DORR

WORLD - WIDE RESEARCH • ENGINEERING • EQUIPMENT

THE DORR COMPANY • ENGINEERS • STAMFORD, CONN.
Offices, Associated Companies or Representatives in principal cities of the world.

DORR EQUIPMENT IS MADE IN CANADA, OF CANADIAN MATERIALS, BY CANADIANS

# Here's our Welcome CARD to Denver

For two generations Denver has been a chief center of manufacturing for the mining industry . . . close to the center of hard rock mining where new ideas could be given the most brutal tests before being offered on the world market.

It is that tradition of product testing that has made Card cars, wheels, trackwork and rope haulage equipment the standard of mining everywhere.

D. C. CARD

R. G. WEAVER

Look for these men assigned to our booth—No. 715—at the Show. They'll be there to welcome you to Denver and be at your service for an enjoyable and profitable MINING SHOW.

**C.S.Card Iron Works Co.**

**2501 WEST 16TH AVE.**
**DENVER, COLORADO**

## headquarters in COLORADO for mining equipment...

BUCYRUS ERIE

Ingersoll-Rand

LETOURNEAU

GM DIESEL POWER — GENERAL MOTORS DIESEL POWER

WRIGHT AIR POWER SAW

Through the years The Colorado Builders' Supply Co. has been headquarters for the preferred brands of mining and construction equipment. Continued high standards of Cobusco service insure complete customer satisfaction, always!

Cobusco DRILL STEEL SERVICE

# Cobusco

THE COLORADO BUILDERS' SUPPLY CO.

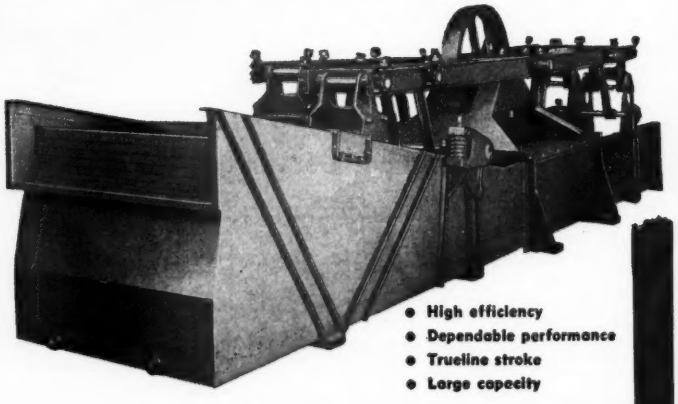
COBUSCO DENVER *Equipment Division* CASPER

MORSE

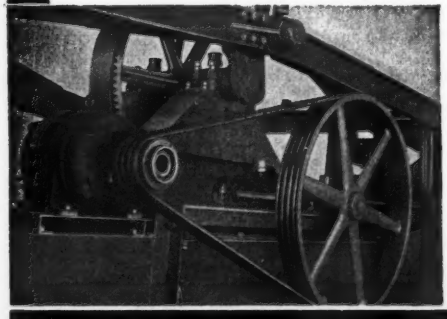
*"Trueline"*

## RAKE CLASSIFIERS

DEPENDABLE CLASSIFIERS THAT IMPROVE PERFORMANCE, SIMPLIFY OPERATION AND LOWER MAINTENANCE.



- High efficiency
- Dependable performance
- Trueline stroke
- Large capacity



**Large and quiescent pool areas give high overflow efficiency. Long "Trueline" strokes, parallel to the tank bottom, discharge the maximum quantity of sands. Fabricated steel construction gives extra strength and long service.**

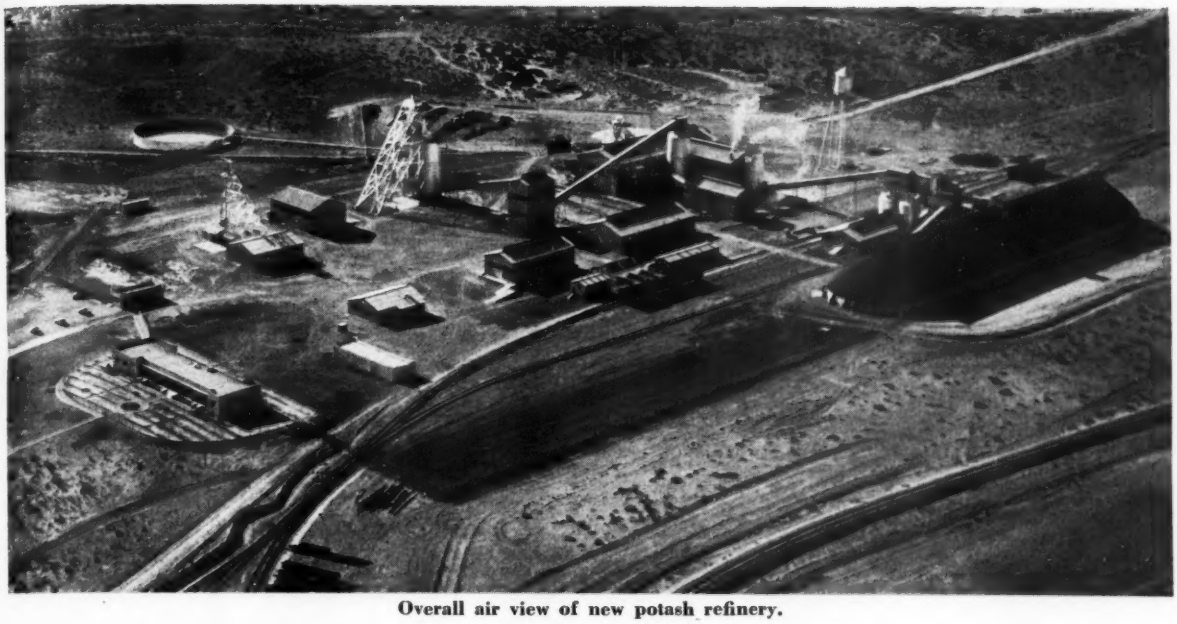
WRITE FOR BULLETIN

Compact Drive
Smooth Operation
Metallurgically Right

MB

MORSE BROS. MACHINERY COMPANY

ESTABLISHED 1898 DENVER, COLORADO, U. S. A. (CABLE MORSE)



Overall air view of new potash refinery.

# America's most modern POTASH REFINERY

**Remote site requires unusual self sufficiency... including office laboratory, repair shops, etc. Entire project was work of Stearns-Roger Mfg. Co.**

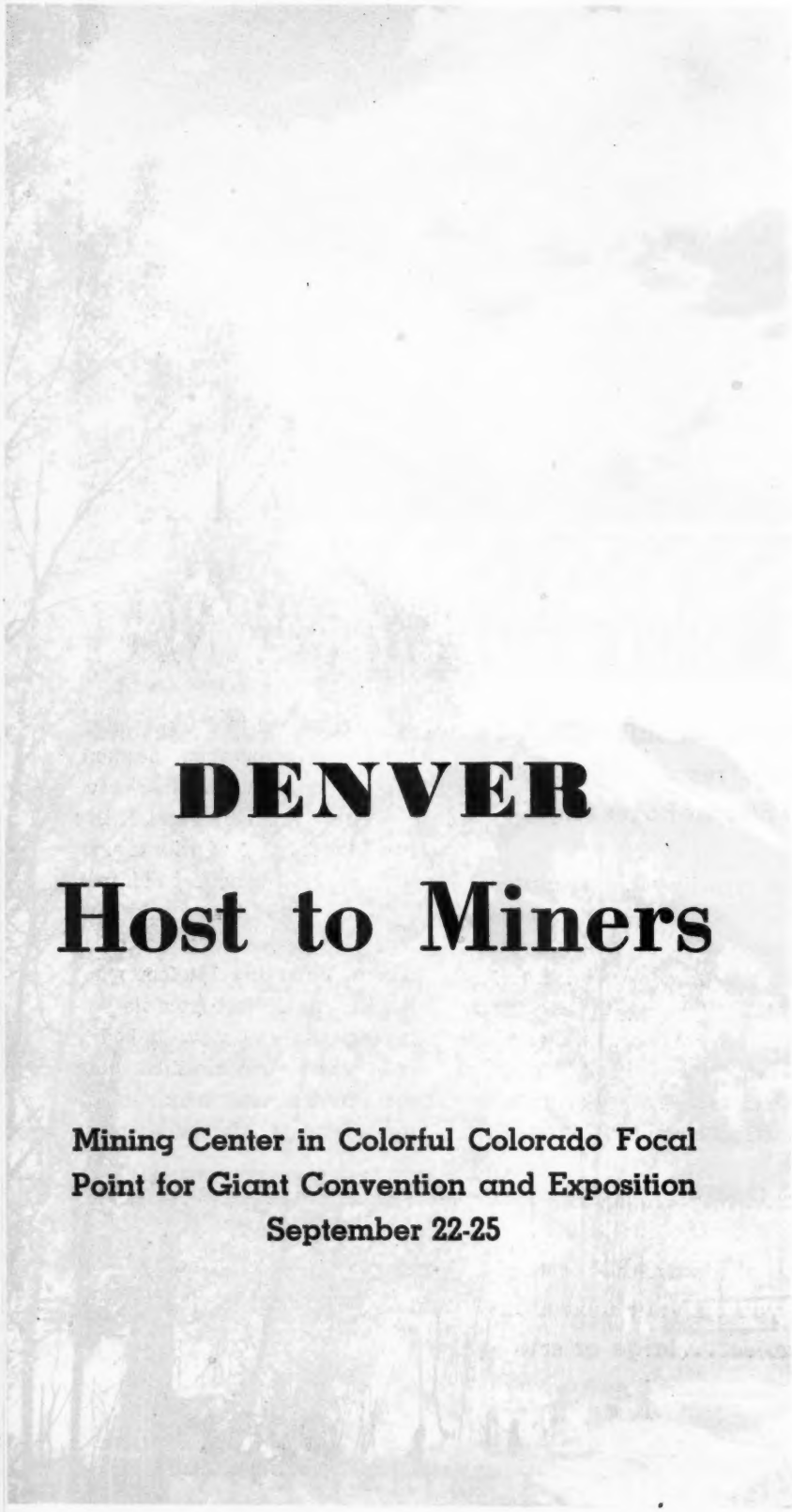
This new potash plant has a rated capacity of 2400 tons of feed per 24 hours. It employs efficient methods and equipment which promise noteworthy increase in output per man hour. Full operation began in March of this year, and the first two months of operation completely bore out the capacity rating estimated by the Stearns-Roger engineers who designed the refinery, in accordance with a metallurgical flow sheet supplied by the customer.

There are two main shafts, both served by a common hoist house which also serves as main electric distribution center. Voltage of 4160 is broken down to 440 at a number of substations about the plant. A temporary head frame was used to sink the main ore shaft. If this had been dismantled prior to erection of the permanent head frame, a serious loss of time would have resulted. Stearns-Roger's solution was to build the 130-foot main head frame 80 feet from its permanent site and move it bodily into place when finished. This saved over a month's time in getting the plant into operation.

**The skill and experience of Stearns-Roger engineers are available to you on your next plant design and erection project... large or small.**

**Stearns-Roger**

THE STEARNS-ROGER MFG. CO. DENVER COLORADO



# DENVER
# Host to Miners

**Mining Center in Colorful Colorado Focal Point for Giant Convention and Exposition September 22-25**

ACTIVITIES of the 1952 Metal and Nonmetallic Mineral Mining Convention and Exposition sponsored by the Western Division, American Mining Congress, will center in Denver's recently completed City Auditorium. Treading close on the heels of the last construction crews, mining men from every corner of the western hemisphere will come pouring in for the biggest Mining Show ever staged in the West.

At this outstanding meeting every phase of the mineral industry from prospecting through production and a multitude of vital economic and legislative problems will be critically examined in the light of present day knowledge and past experience. In addition to a hitherto unequaled exposition of mining machinery, equipment and supplies, the timely papers and discussions will offer mining men an exceptional opportunity to obtain first-hand knowledge of the course that future production practices are likely to follow.

(*Continued on page* 70)

# District Chairmen
# PROGRAM COMMITTEE

**OTTO HERRES**
Vice President
Combined Metals Reduction Co.
**National Chairman**

(not shown)

**LYLE M. BARKER**
**Arizona**

**CHARLES F. HERBERT**
**Alaska**

**BLAIR BURWELL**
**Colorado**

**WM. H. GOODRICH**
**New Mexico**

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**A. C. HARDING**
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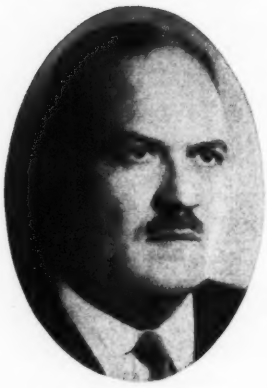
**L. W. STAPLES**
**Oregon**

**CHESTER H. STEELE**
**Montana**

**HARLAN W. WALKER**
**South Dakota**

AMI METAL SHOW



**MERRILL E. SHOUP**
Chairman
Western Division

**HOWARD I. YOUNG**
President
American Mining Congress

**C. B. STAINBACK**
Chairman
Manufacturers Division

The program for this top mining meeting of the year is aimed to satisfy the interests of the men from every branch of the metal and nonmetallic mineral mining industry who will attend. Every mineral production activity plus questions of wide general interest will be given careful attention in the thirteen sessions that have been arranged by a nationwide program committee headed by Otto Herres of Salt Lake City.

At the seven general convention sessions, problems having to do with mineral production and development, national policies affecting mining, progress trends within the industry, and the outlook for the future will be brought out. Able mining men, top ranking government officials and business leaders will review and analyze each subject. Six further sessions will deal with operating problems, new ideas, methods and equipment for underground and open pit mining and ore processing, with special attention to recent developments in mechanization for greater safety and efficiency. Ample time for questions and discussion from the floor has been provided and all present are urged to take advantage of these opportunities to help further the cause of the mineral industry.

Recognition of mining's vital importance to the national econony and to our future security will be evident in the attendance of

**Governor "Dan" Thornton (left) and Mayor of Denver J. Quigg Newton will welcome mining men and ladies to Colorado and to Denver.**

prominent members of both houses of Congress and other outstanding national figures who will participate in the convention program. A special feature of the program will be a series of "panels" or informal discussion periods, in which leading members of the U. S. Senate and House of Representatives will join with industry officials to consider current problems.

A panel discussion on Public Land Policies will be conducted by Senator Arthur V. Watkins of Utah, member of the Senate Interior Affairs Committee with the assistance of Representatives Wesley A. D'Ewart of Montana and Wayne Aspinall of Colorado. Another panel on mine taxation will have members of the House Ways and Means and Senate Finance Committees, in-

*(Continued on page 72)*

ALBERT E. SEEP
Vice-Chairman

WILLIAM J. COULTER
General Chairman

C. J. ABRAMS
Secretary

# Arrangements Committees

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Chairman

MRS. H. B. CRANDELL
Vice-Chairman

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Chairman

HARVEY L. TEDROW
Vice-Chairman

## PUBLICITY COMMITTEE

J. PRICE BRISCOE
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GEROULD A. SABIN
Vice-Chairman

WALTER E. SCOTT, JR.
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## RECEPTION COMMITTEE

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R. W. EVANS
Vice-Chairman

HORACE M. ALBRIGHT

JOEL M. BOWLBY

WORTHEN BRADLEY

LOUIS S. CATES

CHARLES R. COX

## METAL AND NONMETALLIC MINERAL MINING DIRECTORS

(Not Shown)

NEIL W. RICE

RUDOLPH T. ELSTAD

ANDREW FLETCHER

V. P. GEFFINE

R. A. HUMMEL

H. C. JACKSON

PAUL B. JESSUP

MERRILL E. SHOUP

cluding Representative Thomas E. Martin of Iowa, as Moderator, Senator Edwin C. Johnson of Colorado and Representative Wilbur D. Mills of Arkansas as participants. In both cases, leading mining men will discuss the issues informally with the legislators.

The widely publicized "Paley Report" will be reviewed in another panel discussion led by Arthur H. Bunker and George Rufus Brown, members of the commission. This forecast of America's minerals and metals outlook is attracting general attention, not only in the mining industry, but among all those interested in the industrial future of the United States. Among its recommendations are many that have aroused considerable controversy, and these will be thoroughly threshed out during the session.

Other prominent speakers will include Senator Pat McCarran of Nevada, Senator Harry C. Dworshak of Idaho, Senator Francis Case of South Dakota, and Representative Wingate H. Lucas of Texas. Henry D. Smyth, member of the U. S. Atomic Energy Commission and author of the "Smyth Report," will review our progress in the development and use of atomic energy. Burt B. Brewster, well known mining engineer and publisher of Salt Lake City, will lead a symposium on the problems faced by the smaller mine operators and John W. Vanderwilt, President, Colorado School of Mines, has organized a timely program devoted to prospecting and exploration for new mineral reserves. To deal with strategic minerals, taxation, and other

(*Continued on page* 75)

★ ★ ★

# PROGRAM Committee

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**ROY B. EARLING**
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*Colorado Creek Mining Co.*

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*Goodnews Bay Mining Co.*

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*Alluvial Golds, Inc.*

**HAROLD STRANDBERG**
*Strandberg & Sons*

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*Magma Copper Co.*

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*Arizona Dept. of Mineral Resources*

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**A. P. MORRIS**
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**JOHN R. RICHARDS**
*St. Anthony Mining & Development Co., Ltd.*

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*U. S. Bureau of Mines*

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*Arizona Small Mine Operators Assn.*

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*Mng. Engr., San Francisco*

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*Bradley Mining Co.*

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*Anaconda Copper Mining Co.*

**GEORGE D. DUB**
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*Gordon I. Gould & Co.*

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*Mining Association of the Southwest*

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*Consulting Engr., San Francisco*

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*Consulting Geol., Berkeley*

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*Colorado School of Mines*

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*U. S. Atomic Energy Commission*

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*Bunker Hill Smelter*

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*American Smelting & Refining Co.*

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*Food Machinery & Chemical Corp.*

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**R. B. CAPLES**
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*Anaconda Copper Mining Co.*

**R. H. GLOVER**
*Anaconda Copper Mining Co.*

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*Anaconda Copper Mining Co.*

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*American Smelting & Refining Co.*

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**CARL J. TRAUERMAN**
*Mining Assn. of Montana*

**J. R. VAN PELT**
*Montana School of Mines*

# Program Committee—continued

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*Combined Metals Reduction Co.*

**T. COPELAND**
*Eagle-Picher Co.*

**NORMAN HANSON**
*Basic Refractories, Inc.*

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*Getchell Mine, Inc.*

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*U. S. Bureau of Mines*

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*International Minerals & Chemical Corp.*

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*Empire Zinc Co.*

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*New Mexico Mining Assn.*

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*Peru Mining Co.*

**ALVIN J. THOMPSON**
*New Mexico Institute of Mining & Technology*

**JOHN A. WOOD**
*Chapman & Wood*

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*Raw Materials Survey*

**FAY I. BRISTOL**
*Bristol Silica Co.*

**FRANK E. LEWIS**
*Cordero Mining Co.*

**F. W. LIBBEY**
*Oregon State Dept. of Geology & Mineral Industries*

**RALPH S. MASON**
*Oregon State Dept. of Geology & Mineral Industries*

**S. H. WILLISTON**
*Cordero Mining Co.*

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**RICHARD J. STOEHR**
*Bald Mountain Mining Co.*

**GERALD R. VAN DUZEE**
*South Dakota School of Mines & Technology*

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**O. D. NIEDERMEYER**
*National Lead Co.*

**EUGENE M. THOMAS**
*Texas Western College*

**H. E. TREICHLER**
*Texas Gulf Sulphur Co.*

**GEORGE F. ZOFFMAN**
*Duval Texas Sulphur Co.*

## UTAH

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*Mining & Contracting Review*

**J. P. CAULFIELD**
*Kennecott Copper Corp.*

**J. BRUCE CLEMMER**
*U. S. Bureau of Mines*

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*Chief Consolidated Mining Co.*

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**JAMES IVERS**
*Silver King Coalition Mines Co.*

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*Utah Mining Assn.*

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*Dept. of Mining, University of Utah*

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**F. A. WARDLAW, JR.**
*International Smelting & Refining Co.*

**LOREN J. WESTHAVER**
*United States Steel Co.*

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*Howe Sound Co.*

**BARCLAY GOODSELL**
*Spokane*

**T. HIGINBOTHAM**
*Goldfield Consolidated Mines Co.*

**CHARLES B. JACOBS**
*State Dept. of Labor & Industries*

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**P. A. LEWIS**
*American Smelting & Refining Co.*

**FRANK LILLY**
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**ROGER O. OSCARSON**
*Spokane*

**W. A. RICHELSEN**
*West Coast Mineral Assn.*

**J. P. SPIELMAN**
*Washington School of Mines*

**W. L. ZEIGLER**
*Pend Oreille Mines & Metals Co.*

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**RALPH S. BLITZ**
*Engr., Riverton*

**J. ELMER BROCK**
*Wyoming Natural Resource Board*

**MAXWELL STRUTHERS BURT**
*Moran*

**WALTER E. DUNCAN**
*University of Wyoming*

**WALTER D. FINNEGAN**
*U. S. Bureau of Mines*

**HENRY G. FISK**
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**E. R. LUND**
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**V. O. MURRAY**
*Union Pacific Coal Co.*

**J. B. PERRY**
*Westvaco Chemical Div.*

**RALPH H. PLATT**
*Golden Clover & Vermiculite*

**C. O. STEPHENS**
*Worland Plant, Texas Gulf Sulphur Co.*

**HORACE D. THOMAS**
*University of Wyoming*

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**Z. W. BARTLETT**
*Freeport Sulphur Co.*

**O. W. BILHARZ**
*Bilharz Mining Co.*

**S. S. CLARKE**
*Eagle-Picher Co.*

**ED CRABTREE**
*Eagle-Picher Co.*

**C. M. EVANS**
*Harbison-Walker Refractories Co.*

**E. L. GIBSON**
*General Portland Cement Co.*

**ELMER A. JONES**
*St. Joseph Lead Co.*

**WILLARD C. LAY**
*Alcoa Mining Co.*

**I. M. LeBARON**
*International Minerals & Chemical Corp.*

**GILL MONTGOMERY**
*Minerva Oil Co.*

**FRANK MOYLE**
*Marquette Cement Manufacturing Co.*

**E. C. SCHROEDER**
*The Schroeder Co.*

**DAN R. STEWART**
*American Zinc, Lead & Smelting Co.*

## LAKE SUPERIOR DISTRICT

**R. S. ARCHIBALD**
*North Range Mining Co.*

**L. P. BARRETT**
*Jones & Laughlin Ore Co.*

**FAYETTE BROWN, JR.**
*Cleveland-Cliffs Iron Co.*

**A. J. CAYIA**
*Inland Steel Co.*

**ALEX D. CHISHOLM**
*Pickands Mather & Co.*

**E. W. DAVIS**
*University of Minnesota*

**GROVER E. LeVEQUE**
*Jones & Laughlin Steel Corp.*

**R. J. LINNEY**
*Reserve Mining Co.*

**ENDICOTT R. LOVELL**
*Calumet & Hecla Consolidated Copper Co.*

**W. N. MATHESON, JR.**
*Oliver Iron Mining Div., U. S. Steel Co.*

**RAY D. NOLAN**
*State Department of Conservation*

**J. MURRAY RIDDELL**
*Michigan College of Mining & Technology*

**DAVID N. SKILLINGS**
*Skillings Mining Review*

**J. WILBUR VAN EVERA**
*Consultant, Crosby*

**R. W. WHITNEY**
*M. A. Hanna Co.*

EASTERN STATES

TH. AVNSOE
*Lone Star Cement Co.*

FRANK A. AYER
*New York City*

C. H. BEHRE, JR.
*Columbia University*

FRANK CAMERON
*St. Joseph Lead Co.*

HARLEY A. COY
*American Zinc Co. of Tennessee*

E. P. DIENER
*Universal Atlas Cement Co.*

C. M. HAIGHT
*New Jersey Zinc Co.*

ERNEST V. GENT
*American Zinc Institute, Inc.*

E. B. JENNINGS
*Tennessee Coal & Iron Div., U. S. Steel Co.*

W. LUNSFORD LONG
*Haile Gold Mines, Inc.*

PLATO MALOZEMOFF
*Newmont Mining Corp.*

R. J. MECHIN
*St. Joseph Lead Co.*

F. M. MILLER
*General Refractories Co.*

T. A. MITCHELL
*Tennessee Copper Co.*

THOMAS G. MOORE
*American Metal Co. Ltd.*

W. M. PEIRCE
*New Jersey Zinc Co.*

HOWARD S. PONZER
*Giant Portland Cement Co.*

ROBERT H. RAMSEY
*Engineering & Mining Journal*

E. H. ROSE
*Tennessee Coal & Iron Div., U. S. Steel Co.*

R. T. VANDERBILT
*R. T. Vanderbilt Co., Inc.*

GLOYD M. WILES
*National Lead Co.*

J. P. WOOD
*Humphrey's Gold Corp.*

MINING EQUIPMENT MANUFACTURERS

W. E. COLLINS, JR.
*Atlas Powder Co.*

GEORGE P. FENN
*Caterpillar Tractor Co.*

R. H. FOX
*Vulcan Iron Works Co.*

WILLIAM E. GOODMAN
*Goodman Manufacturing Co.*

G. W. HOSKINS
*Harnischfeger Corp.*

H. V. HUGHES
*Southwestern Engineering Co.*

S. H. JOHNS
*Independent Pneumatic Tool Co.*

J. C. KEPLINGER
*Hercules Motors Corp.*

L. O. MILLARD
*Link-Belt Co.*

R. R. MORGAN
*Le Roi Co.*

C. LYNN PETERSON
*Peterson Filters & Engineering Co.*

E. M. PLATTS
*Joy Manufacturing Co.*

J. ROSENBLATT
*Eimco Corp.*

HORACE U. SIEGEL
*Western Rock Bit Manufacturing Co.*

HARRY E. SMITH
*Raybestos-Manhattan, Inc.*

V. L. SNOW
*Euclid Road Machinery Co.*

CHAS. B. STAINBACK
*Westinghouse Electric Corp.*

W. D. TURNBULL
*Kennametal Inc.*

R. H. WEEKS, JR.
*Thomas A. Edison, Inc.*

C. G. WILLARD
*Mine & Smelter Supply Co.*

J. E. M. WILSON
*Jeffrey Manufacturing Co.*

subjects of special interest, there will be several "round-table" conferences.

The outstanding group of mining men who are taking an active part in the program includes Howard I. Young, President, American Mining Congress and President of the American Zinc, Lead and Smelting Co.; Otto Herres, Vice-President, Combined Metals Reduction Co. and National Chairman of the Program Committee; Merrill E. Shoup, Chairman of the Western Division of the American Mining Congress and President of the Golden Cycle Corp.; and Charles B. Stainback of the Westinghouse Electric Corp., Chairman, Manufacturers Division. These men and hundreds of others who have had a hand in the forming of the program for this outstanding meeting deserve the warmest thanks of the entire mineral industry for their hearty cooperation.

### Committees Rate Praise

Members of the Denver arrangements committees have likewise been working hard to set the stage for this unusually valuable meeting. Led by General Chairman William J. Coulter, Climax Molybdenum Co., and Vice-Chairman Albert E. Seep of the Mine and Smelter Supply Co., the General Arrangements Committee, with C. J. Abrams as Secretary, has done a really fine job. Each of the other local committees—the Attendance Committee with J. Paul Harrison as Chairman and Harvey L. Tedrow, Vice-Chairman; the Trips Committee with Chairman E. D. Dickerman aided by G. R. Harris and R. W. Evans as Vice-Chairmen; the Publicity Committee headed by Chairman J. Price Briscoe, with Gerould A. Sabin and Walter E. Scott, Jr., as Vice-Chairmen—is turning in a remarkable performance in the various phases of Convention preparations. The Reception Committee, charged with the task of making all those attending the Convention feel at home in Denver, is headed by Oscar H. Johnson as Chairman and R. H. Summer as Vice-Chairman.

Mrs. B. C. Essig as Chairman and Mrs. H. B. Crandell as Vice-Chairman of the Ladies' Committee have also done a splendid job in organizing a special program for the entertainment of the many ladies who are expected to attend the Convention and Exposition.

### Biggest Exposition Ever

Every branch of the mineral industry will find a complete array of the latest machinery, tools and supplies for mining, milling and ore processing on display inside and outside the City Auditorium Exhibition Hall. More than 140 exhibitors will occupy over 57,000 net square feet of space. In these exhibits will be shown equipment for exploration, rock drilling, blasting, trans-

(*Continued on page 78*)

ARTHUR H. BUNKER

GEORGE R. BROWN

SEN. ED. JOHNSON

REP. W. N. ASPINALL

## PROGRAM

# MONDAY, SEPTEMBER 22

**8:30 A.M. REGISTRATION, City Auditorium**
(Exhibits and all Convention Sessions will be held in City Auditorium, 13th & Curtis Streets. A special motion picture will be shown preceding each session.)

## 10:15 A.M. Opening Session

**Presiding:** MERRILL E. SHOUP, *Pres.*, Golden Cycle Corp., Colorado Springs; Chairman, Western Division, A.M.C.

**Welcome to Denver and to Colorado:**

HON. JAMES QUIGG NEWTON, JR., Mayor of Denver
HON. DANIEL I. V. THORNTON, Governor of Colorado

**Responses:**

HOWARD I. YOUNG, *Pres.*, American Zinc, Lead & Smelting Co., St. Louis; President, American Mining Congress
OTTO HERRES, *Vice-Pres.*, Combined Metals Reduction Co., Salt Lake City; National Chairman, Program Committee
WILLIAM J. COULTER, *Vice-Pres.*, Climax Molybdenum Co., Denver; General Chairman, Arrangements Committees
CHARLES B. STAINBACK, *Industrial Syndicate Mgr.*, Westinghouse Electric Corp., Pittsburgh; Chairman, Manufacturers Division, A.M.C.

**Introduction of Distinguished Guests**

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**Presiding:** HOWARD I. YOUNG, *Pres.*, American Zinc, Lead & Smelting Co., St. Louis; President, American Mining Congress

**Panel Discussion—"Paley Commission" Report and National Mineral Policies Generally**

**Led by:** ARTHUR H. BUNKER, Pres., Climax Molybdenum Co., New York; Member of the Commission
GEORGE RUFUS BROWN, Houston, Texas; Member of the Commission

**Panel Participants:**

HON. HENRY C. DWORSHAK, *U. S. Senator from Idaho*
HORACE M. ALBRIGHT, *Pres.*, United States Potash Co.
ANDREW FLETCHER, *Pres.*, St. Joseph Lead Co.
IRA B. JORALEMON, *Consulting Engr.*, San Francisco
EVAN JUST, *Vice-Pres.*, Cyprus Mines Corp.
J. C. KINNEAR, *Special Assistant to Chairman*, Office of Defense Mobilization
DONALD H. MCLAUGHLIN, *Pres.*, Homestake Mining Co.
E. H. SNYDER, *Pres.*, Combined Metals Reduction Co.
SIMON D. STRAUSS, *Vice-Pres.*, American Smelting & Refining Co.

(Because of the wide interest in this subject and the need for thorough consideration, this panel discussion will be continued in the afternoon session.)

## 2:00 P.M. National Mineral Policies

**Continuation of Panel Discussion on "Paley Commission" Report**
(Panel Participants shown under Monday morning session)

**Defense Minerals Progress**
HOWARD I. YOUNG, *Deputy Administrator*, Defense Materials Procurement Agency

**Reports of Resolutions Committee:**
General Policy
Stockpiling—Tariffs—Incentives to Mining

**1:30 P.M. PRE-SESSION MOTION PICTURE—"Mechanized Mining at Grandview"**
(Comments by DALE I. HAYES, Western Mgr., American Zinc, Lead & Smelting Co., Spokane)

## 2:00 P.M. Progress in Mechanization

**Chairman:** GLOYD M. WILES, *Mgr. of Mining Dept.*, National Lead Co.

**Trends in Underground Mechanization**
S. S. CLARKE, *Gen. Supt.*, Tri-State Mines, Eagle-Picher Co.

**Packaged Timber Handling at Hecla**
WM. H. LOVE, *Supt.*, Hecla-Atlas Project, Hecla Mining Co.

SEN. H. C. DWORSHAK

SEN. A. V. WATKINS

REP. W. A. D'EWART

REP. W. H. LUCAS

SEN. PAT McCARRAN

REP. T. E. MARTIN

REP. WILBUR MILLS

SEN. FRANCIS CASE

SEN. G. W. MALONE

DR. HENRY SMYTH

**Use of Diesels Underground**
J. H. EAST, JR., *Regional Dir.*, Region IV, U. S. Bureau of Mines

**Discussion:** JOHN S. WISE, *Supt.*, Idarado Mining Co.
JOHN L. FELLOWS, *Engr.*, Limestone Dept., Great Western Sugar Co.
VICTOR C. ALLEN, *Gen. Supt.*, Tri-State Zinc Co.
JOHN O. JONES, *Uranium Miner*, Grand Junction, Colo.

**Responsibility of Manufacturer and Mine Operator**
EWALD KIPP, Eimco Corp.

## 6:00 P.M. Mining Jamboree—

**Rainbow Ballroom, 38 East 5th Avenue**

# TUESDAY, SEPTEMBER 23

**8:30 A.M. REGISTRATION, City Auditorium**

## 9:45 A.M. Public Lands Panel

**Moderator:** HON. ARTHUR V. WATKINS, *U. S. Senator from Utah*

**Panel Participants:**
HON. WESLEY A. D'EWART, *Member of Congress from Montana*
HON. WAYNE N. ASPINALL, *Member of Congress from Colorado*
ROBERT M. SEARLS, *Attorney-at-Law*, San Francisco
A. O. BARTELL, *Managing Engr.*, Raw Materials Survey
R. B. HOLBROOK, *Attorney-at-Law*, Salt Lake City

**Report of Resolutions Committee:** Public Land Policy

## 11:00 A.M. Small Miners' Panel

**Chairman:** BURT B. BREWSTER, *Editor & Publisher*, Mining & Contracting Review

**Small and Independent Uranium Miners**
H. W. BALSLEY, Moab, Utah

**Tungsten**
GEORGE H. TEAL, Boulder, Colo.

**Manganese**
To be announced.

**The Smelters and the Small Miner**
E. McL. TITTMANN, *Gen. Mgr.*, Western Dept., American Smelting & Refining Co.

**"Summing Up"**
ROBERT S. PALMER, *Exec. Dir.*, Colorado Mining Assn.

## 9:45 A.M. Open Pit Mining

**Chairman:** WILLIAM H. GOODRICH, *Gen. Mgr.*, Chino Mines Div., Kennecott Copper Corp.

**Blasthole Rotary Drilling in Open Pit Mining**
GEORGE R. PUTNAM, *Vice-Pres., & Gen. Mgr.*, Utah Construction Co.

**Large Capacity Truck Operation and Maintenance**
H. CARROLL WEED, *Asst. Gen. Mgr.*, Inspiration Consolidated Copper Co.

**Discussion:** CHAS. A. LINDBERG, *Supervisor of Truck Maintenance*, Oliver Iron Mining Division, U. S. Steel Co.
JOSEPH WELLS, *Pres.*, Wells Cargo

**Hydraulic Transportation of Solids**
I. S. TILLOTSON, *Mining Supt.*, International Minerals & Chemical Corp.

## 2:00 P.M. Manpower—Labor Relations

**Chairman:** J. B. HAFFNER, *Gen. Mgr.*, Bunker Hill & Sullivan Mining & Concentrating Co.

**Eliminating Subversives from Government**
HON. PAT MCCARRAN, *U. S. Senator from Nevada*

**A Sound Labor Relations Program**
HON. WINGATE H. LUCAS, *Member of Congress from Texas*

(*Continued on page* 80)

AMC METAL SHOW

portation and for each of the specialized operations, carried on in the production and treatment of ores and nonmetallic minerals. Manufacturers' representatives will be on hand to answer questions and confer with operating men, to explain the most efficient application of their products. Manufacturers participating in the exposition and a description of their displays are listed in this isue, beginning on page 83.

Sessions of the Convention have been scheduled to allow visitors ample time to study the exhibits and to talk with the technical staffs sent by the manufacturers.

In the Exposition halls will be found the answer to every mining man's search for ways to increase production with lower costs and greater safety. Because of the completeness of the exhibits; because of the opportunities to see and compare; because of the chance to talk with and question the manufacturers' representatives on specific problems, the Mining Show presents an unparalleled educational opportunity for the many men from their production and engineering staffs whom mining companies are planning to send to Denver this year. These companies have found that the broader knowledge and renewed enthusiasm brought back from the Mining Show pay off in new ideas and greater output throughout the year.

# WESTERN DIVISION

## THE AMERICAN CONGRESS

MERRILL E. SHOUP, Chairman
President, Golden Cycle Corp.

•

### BOARD OF GOVERNORS

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O. W. BILHARZ, Pres., Bilharz Mining Co.

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P. R. BRADLEY, JR., Alaska Juneau Gold Mining Co.

WORTHEN BRADLEY, Pres., Bradley Mining Co.

FAY I. BRISTOL, Pres., Bristol Silica Co.

WM. C. BROWNING, Western Repr., Gold Fields American Development Co.

J. H. BUCHANAN, Pres., Nellie B. Mining Co.

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T. M. CRAMER, Gen. Mgr., U. S. Potash Co.

J. J. CURZON, Mgr., Chelan Div., Howe Sound Co.

KUNO DOERR, JR., Mgr., East Helena Plant, American Smelting & Refining Co.

ROY B. EARLING, U. S. Smelting Refining & Mining Co.

N. P. GOODRICH, Acting Mgr., Bald Mountain Mining Co.

WESLEY P. GOSS, Vice Pres. & Gen. Mgr., Magma Copper Co.

ROY A. HARDY, Cons. Eng. in Chg., Getchell Mine, Inc.

WALTER M. HORNE, Asst. Mgr., Utah Mining Assn.

ELMER ISERN, Pres., Eagle-Picher Mining & Smelting Co.

OSCAR H. JOHNSON, Pres., Idarado Mining Co.

CHAS. J. JOHNSTON, Pres., Goodnews Bay Mining Co.

J. C. KINNEAR, JR., Gen. Mgr., Nevada Mines Div., Kennecott Copper Corp.

CHARLES R. KUZELL, Gen. Mgr., Phelps Dodge Corp.

F. W. LIBBEY, Dir., Oregon State Dept. of Geol. & Mineral Industries.

E. S. McGLONE, Exec. Vice Pres., Anaconda Copper Mining Co.

FRANK N. MARR, Pres., Spokane-Idaho Mining Co.

HARRY W. MARSH, Secy., Idaho Mining Assn.

DWIGHT H. PLACARD, Exec. Secy., New Mexico Mining Assn.

ROBERT S. PALMER, Exec. Dir., Colorado Mining Assn.

HENRY M. RIVES, Secy. & Treas., Nevada Mine Operators Assn.

BEN D. ROBERTS, Mgr., Southwestern Dept., American Smelting & Refining Co.

W. G. ROUILLARD, American Smelting & Refining Co.

E. C. STEPHENS, Pres., Northwest Mining Assn.

JOS. H. TAYLOR, Vice Pres., Peru Mining Co.

CARL J. TRAUERMAN, Secy. & Treas., Mining Association of Montana.

H. E. TREICHLER, Vice Pres. & Gen. Mgr., Texas Gulf Sulphur Co.

F. C. van DEINSE, Vice Pres. & Gen. Mgr., Yuba Consolidated Gold Fields

CHARLES F. WILLIS, State Secy., Arizona Small Mine Operators Assn.

S. H. WILLISTON, Vice Pres., Cordero Mining Co.

RICHARD A. YOUNG, Vice Pres., American Zinc Co. of Illinois.

### Resolution Committee to Meet

A 30-man Resolutions Committee for the Convention has been appointed by Western Division Chairman Merrill E. Shoup. Kenneth C. Kellar of Lead, S. D., has been named chairman of the committee and a number of sub-committees have been appointed to give advance consideration to topics of major importance to be included in the industry's "Declaration of Policy."

These sub-committees and their chairmen are: General Policy, Kenneth C. Kellar, Kellar, Kellar, & Driscoll, Lead, S. D.; Labor Relations, Charles R. Kuzell, Gen. Mgr., Phelps Dodge Corp., Douglas, Ariz.; Taxation and Government Expenditures, Henry B. Fernald, Loomis, Suffern & Fernald, 80 Broad St., New York; Gold, Silver, and Monetary Policy, Donald H. McLaughlin, President, Homestake Mining Co., 100 Bush St., San Francisco; Stockpiling-Tariff-Incentives to Mining, Otto Herres, Vice-Pres., Combined Metals Reduction Co., Salt Lake City; Public Land Policy, Robert M. Searls, Counsel, California Chapter, AMC, Standard Oil Bldg., San Francisco; Mine Financing, Carl J. Trauerman, Mgr., Mining Association of Montana, Butte, Mont.; Government Agency Reorganization, Horace M. Albright, President, U. S. Potash Co., 30 Rockefeller Plaza, New York.

These committees are devoting their efforts to the development of sound and constructive statements of policy for consideration by the Convention and will welcome comments and suggestions from mining men. These may be in the form of proposed revisions or amendments to the "Declaration" adopted at Los Angeles last year (December JOURNAL, p. 41), or may include comments on any other subject on which it is felt that the industry should take a public position. These suggestions should be sent in writing to the American Mining Congress, Ring Building, Washington 6, D. C.

When the Resolutions Committee meets in Denver on Saturday, September 20, it will also be prepared to devote a reasonable amount of time to hearing directly from mining men who wish to supplement their written recommendations. Anyone wishing to present his views in person on a specific subject should so advise the Washington office at an early date, setting forth fully the substance of what he wishes to say.

The brilliant cast will make "An Evening with Victor Herbert" an unforgettable experience.

As it has been the practice in past years, the reports of the Resolutions Committee will be submitted in sections, at appropriate points during the various convention sessions. This practice affords opportunity for the convention to give complete consideration to important industry policies, and also facilitates their reporting by the nation's press.

### Entertainment Plans Outstanding

Mining Congress meetings are famous for the opportunities they afford for good fellowship and convivial meetings with old and new friends. The 1952 Convention will be no exception in this respect, and the special parties arranged for Monday and Thursday evenings will be especially memorable events. Tuesday and Wednesday evenings have been left entirely free for the informal get-togethers and visiting among friends that are so much a feature of AMC meetings. There will be plenty of time for "free-lance" fun or just plain "settin' and visitin'."

Monday night the Miners Jamboree will

(*Continued on page* 81)

# PROGRAM

(*Continued from page 77*)

**Recent Wage Contract Negotiations**
PAUL H. HUNT, *Vice-Pres. & Gen. Mgr.*, Park Utah Consolidated Mines Co.

**Report of Resolutions Committee:** Manpower and Labor Relations

## 2:00 P.M. Shaft Sinking; Roof Support

**Chairman:** FRANK J. SMITH, *Vice-Pres.*, Oglebay Norton & Co.

**Improvements in Shaft Mucking—A Symposium**
ELMER TOMKINSON, *Mine Supt.*, Iron King Branch, Shattuck-Denn Mining Corp.
JOHN G. HALL, *Gen. Supt.*, Chief Consolidated Mining Co.
F. W. SAUERWEIN, *Mine Engr.*, Sterling Mine, New Jersey Zinc Co.

**Roof Bolting at T.C.I.'s Ore Mines**
L. S. CHABOT, *Works Industrial Engr.*, Tennessee Coal & Iron Division, U. S. Steel Co.

**Accounts of Roof Bolting Progress:**
LLOYD POLLISH, *Research Engr.*, Anaconda Copper Mining Co.
WM. B. FOSTER, *Engr.*, Sunshine Mining Co.
CARMEN A. ROMANO, *Resident Mgr.*, Westvaco Chemical Division

**A Highly Mechanized Shaft Sinking Operation**
C. KREMER BAIN, *Consulting Engr.*, St. Joseph Lead Co.

## Evening—Open

# WEDNESDAY, SEPTEMBER 24

**8:30 A.M. REGISTRATION, City Auditorium**

## 9:45 A.M. Taxation Panel

**Moderator:** HON. THOMAS E. MARTIN, *Member of Congress from Iowa*

**Panel Participants:** HON. EDWIN C. JOHNSON, *U. S. Senator from Colorado*
HON. WILBUR D. MILLS, *Member of Congress from Arkansas*
HENRY B. FERNALD, Loomis, Suffern & Fernald, New York; Chairman, A.M.C. Tax Committee
ELLSWORTH C. ALVORD, Alvord & Alvord, Washington, D. C.; Tax Counsel, American Mining Congress
L. J. RANDALL, *Pres.*, Hecla Mining Co.

**Report of Resolutions Committee:** Taxation; Government Expenditures

## 11:00 A.M. Gold, Silver and Monetary Policy

**Chairman:** DONALD H. MCLAUGHLIN, *Pres.*, Homestake Mining Co.; Chairman, A.M.C. Gold Producers Committee

**Hard Money vs. Inflation**
HON. FRANCIS CASE, *U. S. Senator from South Dakota*

**Report of Resolutions Committee:** Gold, Silver and Monetary Policy

## 9:45 A.M. Advances in Milling Practice

**Chairman:** ROY A. HARDY, *Consulting Engr.*, Getchell Mine, Inc.

**Treatment of Complex Lead-Zinc Ores**
BLAIR L. SACKETT, *Metallurgical Mgr.*, International Smelting & Refining Co.

**Discussion:** W. L. ZEIGLER, *Gen. Mgr.*, Pend Oreille Mines & Metals Co.

**Applications of Rod Mills and Ball Mills at Hayden Concentrator**
J. L. STEVENS, *Mill Supt.*, Ray Mines Div., Kennecott Copper Corp.

**Improvements in Milling Practice in Southeast Missouri**
NORMAN A. STOCKETT, *Gen. Mill Supt.*, St. Joseph Lead Co.

**Upgrading Tungsten Concentrates**
KEITH KUNZE, *Mill Supt.*, Getchell Mine, Inc.

## Afternoon—Open for Inspection of Exhibits (No Convention Sessions)

## 1:30 P.M. Special Conference on Strategic Minerals

Chairman: S. H. WILLISTON, *Chairman*, Strategic Minerals Committee, American Mining Congress

## 2:30 P.M. Special Conference on Mine Taxation

Chairman: HENRY B. FERNALD, *Chairman*, Tax Committee, American Mining Congress

## Evening—Open

# THURSDAY, SEPTEMBER 25

**8:30 A.M. REGISTRATION, City Auditorium**

## 9:45 A.M. Uranium Mining—Atomic Energy

**Chairman:** T. M. WARE, *Chief Engr.*, International Minerals & Chemical Corp.

**Developments in Uranium Mining**
BLAIR BURWELL, *Pres.*, Minerals Engineering Co.

**Progress in Atomic Energy**
HENRY D. SMYTH, *Member*, U. S. Atomic Energy Commission

**Proposed Atomic Energy Plant for Nevada Mine Development**
HON. GEORGE W. MALONE, *U. S. Senator from Nevada*

**Final Report of Resolutions Committee**

## 10:00 A.M. Prospecting and Exploration

**Chairman:** JOHN W. VANDERWILT, *Pres.*, Colorado School of Mines

**Geophysical Prospecting**
E. E. MAILLOT, *Head*, Geophysical Dept., Phelps Dodge Corp.

**The Prospector—Still the Foot Soldier of Mineral Exploration**
MILES P. ROMNEY, *Mgr.*, Utah Mining Assn.

**Airborne Exploration**
To be announced.

**12:00 Noon Luncheon Meeting, Board of Governors, Western Division, A.M.C.**

**2:00 P.M. New Metallurgical Processes**

**Chairman:** J. PAUL HARRISON, *Mgr.*, Colorado Dept., American Smelting & Refining Co.

**Chemico Process for Metal Extraction**

MAJ. GEN. W. N. PORTER, *Pres.*, Chemical Construction Corp.

**Discussion:** E. S. ROBERTS, *Vice-Pres.*, Chemical Construction Corp.

PATRICK J. MCGAULEY, *Project Engr.*, Chemical Construction Corp.

**Zinc Recovery by the Sterling Process**

W. M. PEIRCE, *Licensed Plant Engr.*, New Jersey Zinc Co.

**Treatment of Western Manganese Ores**

C. H. SCHACK and J. V. BATTY, Salt Lake Experiment Station, U. S. Bureau of Mines

**2:00 P.M. Rock Breaking**

**Chairman:** E. R. BORCHERDT, *Chief Research Engr.*, Anaconda Copper Mining Co.

**Choosing Proper Drilling Equipment**

CLARENCE KRAVIG, *Mine Supt.*, Homestake Mining Co.

**Discussion:** A. E. ADAMI, JR., *Engr.*, Anaconda Copper Mining Co.

MAURICE W. HAWKESWORTH, *Research Engr.*, Western Rock Bit Manufacturing Co.

WM. P. CRAWFORD, *Asst. Gen. Supt.*, Phelps Dodge Corp.

**Alloy Hollow Drill Rod**

ROBERT W. PERSONS, *Product Sales Mgr.*, and WM. H. MCCORMICK, *Chief Metallurgist*, Crucible Steel Co. of America

**Discussion:** ANDREW J. ZINKL, *Asst. Mine Supt.*, Iron King Branch, Shattuck-Denn Mining Corp.

J. FRED JOHNSON, *Mgr. of Operations*, Western Mining Dept., American Smelting & Refining Co.

**Blasthole Drilling at Tennessee Copper Co.**

EZELL FLOURNOY, *Mine Engr.*, Tennessee Copper Co.

**8:40 P.M. Victor Herbert Musicale**
**—City Auditorium**

be a gala party in Denver's famous Rainbow Ballroom. Refreshments a-plenty and a fine buffet supper will be followed by dancing and a top-notch entertainment program. Plan now to come early and stay until the last refrain signals the end of a perfect evening.

Thursday night will be "An Evening with Victor Herbert." So great was the demand for this musicale—following the grand success it enjoyed when a condensed version was given at the Mining Congress meeting in Cincinnati this spring—that it was decided to present the full show at Denver, in place of the customary banquet. A company of 65 top-flight singers and musicians has been engaged to perform excerpts from six of the Irish-American composer's best known, most melodic operettas.

Curtain time has been scheduled to allow plenty of time for those attending the many dinner parties being planned, to dine in leisurely fashion and still reach their seats in time for the opening number.

Tickets for both the Miners Jamboree and the musicale may be sold out long before Convention time—if advance interest is any criterion. To be sure not to miss a moment of either of these memorable events, reservation forms should be mailed in as early as possible.

### Special Ladies' Events

In addition to their open invitation to attend all convention functions and field trips, the ladies are especially invited to participate in the fine program of events arranged especially for them.

On Tuesday afternoon, Mr. and Mrs. Stanley Wright have invited all the ladies attending the convention to a reception and tea at their beautiful home.

The Silver Glade at the Cosmopolitan Hotel has been reserved for a luncheon on Wednesday, to be followed by a style show staged by Neusteter's of Denver, and on Thursday the ladies will have the opportunity to enjoy some of the attractions of the Colorado Rockies. A scenic trip is planned through Denver's mountain parks, in full fall color in September, including the famous Red Rocks Park with its open-air amphitheater. The Willow Springs Country Club, near Evergreen, will be the scene of a festive luncheon, after which the return trip to Denver will be made, arriving in plenty of time to prepare for the gala festivities of the evening.

Ladies headquarters will be at the Brown Palace Hotel. Here they can drop in to register for all events, get information on shopping, local points of interest, etc.

### Trips Round Out Week

Denver is at the focal point of a great mining empire and Colorado is famous for its rugged scenic beauty. With these facts in mind, the Trips Committee has arranged a program of seven interesting field trips,

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all but one of which are scheduled for September 26 and 27. That one, on Sunday, September 21, immediately preceding the Convention, will be an excursion to the Colorado School of Mines campus and Research Foundation; it will make early arrival in Denver well worth the while of those interested in mining research and education.

On Friday, Convention visitors will find it hard to choose among the three bus trips and three air trips offered. These visits to various mining districts of Colorado have been fully described in mailings to the industry. They afford an excellent opportunity to see, first-hand, the historic Cripple Creek district; the mine and surface operations at Climax, Leadville, and Gilman; the uranium-vanadium processing plant at Grand Junction; the USBM demonstration mine and shale-oil processing plant at Rifle; the biggest steel plant west of the Mississippi, at Pueblo; the famous Million Dollar Highway and the underground and surface operations of the Idarado Mining Co. at Ouray.

The panorama of Colorado's rugged mountains and well engineered roads that will be unrolled before those who avail themselves of the opportunities offered, coupled with a liberal education in the mining, milling, and processing methods of the progressive companies visited, make this Post-Convention Program a valuable addition to the knowledge and know-how that will be on parade at the convention.

Attendance at the 1952 Metal and Nonmetallic Mineral Mining Convention and Exposition is a "must" for everyone interested in the minerals industry from any angle. In addition to unparalleled opportunities to learn how Government and the Industry are facing and solving vital problems on the economic, legislative and operating fronts, the Exposition provides a veritable gold mine of ideas and inspiration. And—Mr. and Mrs. Mining Man U.S.A. will have the time of their life at the social events where everyone they ever knew will be on hand to take part in the greatest Mining Show ever. The slogan is, *We'll see you in Denver in September.*

# The Exposition

IN THE following pages are described the 146 exhibits of the 1952 Metal and Nonmetallic Mineral Mining Show in Denver. Examine these descriptions carefully, for in the more than 57,000 sq ft of exhibit space will be found the most comprehensive display of modern mining and processing machines, tools, equipment and supplies ever assembled in the West. Here are hundreds of ideas for achieving greater economy, efficiency, and safety in the production of metals and minerals.

**• AERO-COUPLING CORP.**

Booth will feature Aeroquip flexible industrial hose and quick attachable reusable hose end fittings.

Ease of hand assembly of the fittings on the hose will be featured. The value of "on the job" repairs for flexible or rigid tubing used on mining machinery will be stressed.

Typical applications will show Aeroquip flexible lines in use on vital components of air, oil, fuel, coolant, and hydraulic systems. Aeroquip self sealing couplings will be shown as permitting rapid connecting or disconnecting of flexible lines without the loss of fluid, pressure, or the inclusion of air. *In charge—E. G. Hurley.*

**• AERO SERVICE CORP.**

Will show how the industry uses aerial mapping first for photo-reconnaissance, then for dependable topographic mapping of the development area. Stereo photos will show geologic features recorded by air reconnaissance. The usefulness of the airborne magnetometer in successful searches for iron, asbestos and other minerals is also displayed. A magnetic map for a large iron ore body will be displayed, with other magnetic information from over 500,000 miles of AERO surveys. Literature and information about costs, schedules and new uses of aerial surveys will be available. *In charge—C. L. Hess.*

**• ALLEN-SHERMAN-HOFF PUMP CO.**

Will have a background display illustrating the application of Hydroseal pumps on various mill duties and in the foreground will display two or three of their latest design Hydroseal Pumps. Three or four representatives of the company will be on duty at the booth to answer questions of any interested visitors. *In charge—W. B. Stephenson.*

**• ALLIS-CHALMERS MANUFACTURING CO.—GENERAL MACHINERY DIV.**

Will feature an operating 3-ft by 8-ft Ripl-Flo screen with Thermo-Deck heating unit for screening moisture-bearing material. Other equipment to be shown includes

a 1/3 scale model of an A-1 jaw crusher and a model of a Hydrocone crusher, both operating; a rod deck screen a low-head screen mechanism; rubber-lined and process pumps, and a Vari-Pitch motion control sheave. *In charge —R. N. Brown.*

• **ALLIS-CHALMERS MANUFACTURING CO.—TRACTOR DIV.**

Exhibit will feature a crawler tractor Model HD-20G with front end shovel, and a crawler tractor model HD-15 with bulldozer. Attractive and informative shadow boxes and a parts display will complete the exhibit. *In charge—A. E. Dorn.*

• **ALLOY STEEL AND METALS CO.**

Plan to display pictures showing the actual operation of a Pacific Round-the-Corner Sheave Block in conjunction with a Pacific Model 2A-34 in. Slushmaster Scraper and Pacific Model 8-C Sheave Block working in a square-set stope. In addition, they will exhibit the Pacific Round-the-Corner Sheave Block, Pacific Slushmaster Scraper, Pacific Model C and CF Sheave Blocks and Pacific Sheave Anchors. *In charge—John M. McKean.*

• **AMERICAN AIR FILTER CO., INC.**

Operating Models of Type N Roto-Clone and the Type W Roto-Clone, both wet-type dust collectors used for the control of dust released in various mining operations and processes will be featured. The Cycoil oil bath air cleaner and CMS Multi-Duty air filter for the cleaning of engine and compressor intake air will also be shown. *In charge—John Kane.*

• **AMERICAN BRATTICE CLOTH CORP.**

Exhibit will center about the model of their new inflatable brattice for use in the entire mining industry. These have been on test for over a year and pictures and operational data will be available upon request. Also displayed will be Mine Vent tubing with its demountable coupling and ABC brattice cloth. *In charge—D. B. Mikesell.*

• **AMERICAN GILSONITE CO.**

Description of Exhibit not available.

• **AMERICAN MANGANESE STEEL DIV.—AMERICAN BRAKE SHOE CO.**

Plans to show a working scale model of a 10-in. Amsco dredge pump and a model Amsco shovel dipper. They will also display a double-wave crusher liner, Wearsharp dipper tooth repointers, a Rever-sharp tooth, and various hardfacing applications for the mining industry. *In charge—John E. Murtaugh.*

• **AMERICAN MINE DOOR CO.**

Will display as main attraction the Canton Car Transfer in actual size for a Standard installation on 30-lb steel track, 24-in. gauge. A C.S. Card Iron Works car will be used to demonstrate the process of by-passing many cars on a single track. Installation and removal of the device will be demonstrated. An Automatic Switch Thrower and the "Midget" Rock Duster will also be shown. *In charge—Chas. Vignos II and Glenn Gurney.*

• **AMERICAN STEEL & WIRE DIV., U. S. STEEL CO.**

See United States Steel Co.

• **AMERICAN WHEELABRATOR & EQUIPMENT CORP.**

Solving dust and fume problems of the metallurgical and mining industries with the Dustube cloth-tube type Collector will be the theme of the exhibit. A large Dustube Collector with its shaker mechanism sychronized with a colorful, animated flow chart of a typical lead blast furnace fume control application will be the highlight of the exhibit. Convenient inspection of the collector will be possible by means of a cutaway panel in the unit. *In charge—R. L. Andrus and R. T. Pring.*

• **ANACONDA WIRE & CABLE CO.**

Presents a built-up display of five separate panels illustrating five applications of wire and cable in the mine. The first panel displays new shuttle car cable. The other four panels are made up of mine power cables, shovel cables and other similiar wire and cable uses. Each panel is designed to give maximum up-to-date information quickly. *In charge—C. B. Peck.*

• **ARMCO DRAINAGE & METAL PRODUCTS, INC.**

Exhibit will include a full scale tunnel liner, large pictures of a conveyor belt and an industrial railroad track, a fan duct and explosion doors, sheeting, Flexbeam guard rail, and a model Steelox building. *In charge—F. R. Randle.*

• **ATLAS POWDER CO.**

Will exhibit machine-gun photographs showing blasting techniques, emphasizing the advantages gained with the Rockmaster Blasting System. The display will also show progress in mining through the years and progress in the development of explosives. Photographic transparencies will augment actual samples of material in telling this story. *In charge—J. H. Dannenberg.*

• **BARBER-GREENE CO.**

A complete line of Permanent Conveyors will be graphically presented in a photo mural display. The 12 hand-colored murals are enlargements of photographs illustrating 12 typical operations. An attractive addition to this main display piece is four illuminated columns of color transparencies illustrating B-G Conveyors and allied machines in operation. Because conveyor carriers are such a vital and controversial component on a belt conveyor, six carrier units will be featured in the booth. Representatives in attendance will be happy to give the benefit of Barber-Greene's long and successful experience with mine Conveyors. *In charge—H. W. Newton.*

• **BEMIS BRO. BAG CO.**

Will display FLEXIPIPE Ventilation Tubing used for directing fresh air to where it is needed in underground mines and tunnels. Samples of various methods of suspension and different types of couplings will be shown. *In charge—I. D. Teter.*

• **BETHLEHEM STEEL CO.**

Plans to show roof bolts, steel ties, Ar-Moored ties, mine frogs, wire rope, and wheels. Roof bolts are the newest Bethlehem product for mine use and two types will be displayed; (1) a ¾-in headed bolt with plug and expansion shield, and (2) a one-in. slotted bolt with wedge. *In charge—J. R. Ulrich.*

• **BIRD MACHINE CO.;**

Will feature operating demonstrations of the Bird Continuous Centrifugal Filter and the Bird-Young Vacuum Filter. Among the interesting applications of the Bird Filter are the dewatering of fine coal and the filtering of mineral concentrates and tailings. Also on display will be the Bird Centrifugal Classifier for classification of slurries from closed circuit grinding, desliming ahead of flotation and splitting finished ground minerals into definite size groups over a wide range of particle sizes from 200 mesh down to a single micron. *In charge—J. J. Gillis.*

• **BIXBY-ZIMMER ENGINEERING CO.**

Principal feature of this display will be a scale model vibrator, operating and showing the method of mounting and use of Bixby-Zimmer All-Welded Round Rod Stainless Steel Screen. *In charge—R. L. Kaga.*

• **BLACKHAWK MFG. CO.**

Will display their complete line of hydraulic hand jacks, remote control hydraulic Porto-Power equipment and wrenches. The Hydraulic Control Division of Blackhawk will have cutaway samples and a complete exhibit on the line of special purpose rams, pumps, hoses, valves and power units, which are supplied to original equipment manufacturers of mining machinery and equipment. An "Idea Book" will be given those who visit the booth. *In charge—W. V. Dyke.*

• **BRODERICK & BASCOM ROPE CO.**

Booth will be primarily for the purpose of greeting friends and customers. Samples of various types of wire rope and slings will be shown. Four or five men acquainted with the mining trade will be on hand to answer all inquiries concerning mining ropes. *In charge—Texal C. Glazebrook.*

• **BUCYRUS-ERIE CO.**

Plans to display photographs of the company's machines used in the mining industry. Featured prominently will be the company's latest developments in quarry and mining excavators. A scale model of a large Bucyrus-Erie walking dragline will be shown and operated. *In charge—Emory M. Heuston.*

• **BUDA CO.**

Will exhibit four heavy-duty diesel engines and one diesel-electric generator set. Three of the diesel engines will be equipped with torque converter; one with Twin Disc torque converter designed especially for economical powering of heavy-duty haulage and ore trucks; another with Tarcon torque converter designed for powering 2 and 2½ cu yd shovels; and the third designed for powering all types of heavy-duty trucks and haulage units. The 6KW Diesel Electric generator set is one of many models and sizes of generator sets that are suitable for the mining and quarrying industry. *In charge—H. H. Cohenour.*

• **BULLARD CO., E. D.**

Exhibit will feature three new models of molded Fiberglas Hard Boiled Hats and Caps. Announced for the first time is a safety hat guaranteed to test 10,000 volts with a leakage of no more than 5 milliamps, for workers exposed to electrical hazards. This hat also exceeds drop test standards of 40 ft-lb impact. Two new molded Fiberglas Caps, one for coal mining and the other for mine and steel erection are being shown. Improved mine first aid kits and refills are being shown in addition to mine safety belts and other personal safety equipment. *In charge—Alpheus Bull.*

• **CARD IRON WORKS CO., C. S.**

Description of Exhibit not available.

• **CARDOX CORP.**

An Underground AugerMiner, for use in coal mines where thin seams or poor roof conditions make conventional mining impractical, and the Surface AugerMiner, which drills coal from seams where the amount of overburden makes further stripping unprofitable, will be featured. These portable machines use augers to "reach" as far as 100 ft into the seams and drill holes up to 40 in. diam. Both machines may be vertically positioned hydraulically, enabling the operator to keep the auger in the seam and away from impurities. Cardox and Airdox, Non-Explosive Mining Methods, will also be featured. *In charge—T. E. Holton.*

• **CATERPILLAR TRACTOR CO.**

Plan to display their D 7 Tractor with Hystaway, D 4 Tractor with Traxcavator, tractor with wagon and Cutaways. *In charge—W. H. Hogan.*

• **CHICAGO PNEUMATIC TOOL CO.**

A rail-mounted, twin boom "600" Jumbo, and an Airleg will be featured at this exhibit. A six-ft chain feed and a four-ft shell-type feed will be mounted on the Jumbo for exhibit purposes. A working set-up of the new Airleg will be used to demonstrate its operating features. Other drills on exhibit will be a stoper; drifter for use with Tungsten-Carbide bits; diamond drills for coring and blast holing; gasoline-driven skid-mounted core drills; a line of sinker drills for secondary breaking; and demolition tools for trimming and brushing. Air-operated sludge and sump pumps, utility winches, impact wrenches, riveters, chippers, grinders, and heavy-duty air and electric drills will also be shown. Stationary and portable air compressors will be shown pictorially. *In charge—E. R. Goss.*

• **CHRISTENSEN DIAMOND PRODUCTS CO.**

Will exhibit diamond bits. Among the equipment shown will be core bits, casing shoes, casing bits, pilot bits, concave bits and reamers. Also, there will be a display showing the steps required in the manufacture of a diamond bit. Experienced personnel will be on hand to show the variety of sizes and types of diamond bits available to the industry. *In charge—W. I. Harris.*

• **CLEVELAND WORM & GEAR CO.**

Exhibit will include a Cleveland Speedaire fan-cooled worm gear reducer, cut away to show internal construction. The reducer will be in operation; inspection windows will permit seeing how lubricant is carried from the sump and distributed to the bearings. *In charge—D. H. Rowe.*

• **COLORADO BUILDERS' SUPPLY CO.**

Will display a large detailed scale-model exhibit. Actual phases of various types of construction such as concrete highway work, dam construction, mining, reinforced concrete structure work, asphalt paving of city streets and many other examples of maintenance and building projects are graphically portrayed. The model also features a complete farm setting, a down-town area, and two true-scale, operating railroads. *In charge—C. E. Berry.*

• **COLORADO FUEL AND IRON CORP.**

Will establish an area of welcome for visitors to the exposition. Plenty of chairs, divans, tables and water coolers will be provided in pleasant surroundings. Dominating the exhibit will be a secretarial service for conventioneers whose business requires their attention during exhibition hours. Shadow boxes and display boards will exhibit CF&I products for the mining industry but the central theme of the exhibit will be the establishment of facilities for the comfort and convenience of visitors. *In charge—Harmon H. Davis.*

• **COLORADO IRON WORKS CO.**

Display will include models, pictures and literature on Lowden Driers, Skinner Roasters, Akins Classifiers; and for heavy media separations, Akins Densifiers and Akins Separators. *In charge—H. P. Kautz.*

• **COLORADO SCHOOL OF MINES RESEARCH FOUNDATION, INC.**

Plans to set up two or three special pieces of equipment used for ore concentration tests. The booth will be provided with tables and chairs. Literature of the Research

Foundation and The Colorado School of Mines will be available. The walls of the booth will be covered with large scale photographs of the School and of the Research Foundation facilities. One or more members of the staff of the Colorado School of Mines Research Foundation will be in the booth during the regular exhibition hours.

• **COLUMBIA-GENEVA STEEL DIV., U. S. STEEL CO.**

See United States Steel Co.

• **CRUCIBLE STEEL CO. OF AMERICA**

Will exhibit samples of its hollow and solid drill steels. Across the back of the exhibit will be a photographic mural showing the development of mining and mining techniques through the years. There will be experienced sales engineers in attendance, who will be glad to help in any way they can with mining or drill problems. *In charge—Michael Stumm.*

• **CUMMINS ENGINE CO., INC.**

Plans to display two activated cutaway Diesel engines. One engine will be the Model NHRS-600 engine rated at 300 hp at 2100 rpm and the other will be a Model NVHS-1200 engine rated at 550 hp at 2100 rpm. *In charge—J. T. Weber.*

• **DART TRUCK CO.**

Exhibit will consist of an extra-heavy duty mining truck complete with body and hoist—Dart's famous heavy duty planetary type rear axle, a 350 diesel engine, a 3-stage hydraulic torque converter with its down-hill braking feature, together with many Dart "custom-built" features are incorporated into this unit. In addition to this large haulage truck there will also be displayed, cutaway sections of the axle and other component parts. *In charge—C. F. Barber.*

• **DENVER EQUIPMENT CO.**

A Denver "Sub-A" Super Rougher Flotation Machine will be on display. This is a new development in flotation. In addition to the new Denver "Sub-A" Super Rougher Flotation Machine there will be a new DECO Automatic Sampler in operation as well as a Denver Dry Reagent Feeder and a Mineralight display. *In charge— C. V. Johnson.*

• **DETROIT DIESEL DIV.—GENERAL MOTORS CORP.**

Exhibit will include three GM 2 cycle Diesel engines; a 3-cylinder series 71 Torque Converter unit; a 6-cylinder 110 Torque-Converter unit, and a "matched pair" of 6-cylinder series 71 engines with torque converters. Also shown will be a 6-110 motorized cutaway engine, an oil-filled motorized plastic model showing operating features of GM torque-converters and an activated schematic display picturing the GM Diesel fuel system. *In charge—R. V. Baxley.*

• **DINGS MAGNETIC SEPARATOR CO.**

Heart of the exhibit is a display of three types of equipment: Type EBK Crossbelt high intensity magnetic separator for the concentration of weakly magnetic substances; type XW Drum—a wet process separator for concentrating magnetite and taconite ore; and type RM Rectangular Magnet, suspended over a belt, for removing tramp iron. Photographs of the Type IR Induced Roll high intensity magnetic separator used for concentrating; Dings Crockett Separator for recovery of heavy media and concentration of magnetite, and the Dings electromagnetic pulley for tramp iron removal, will form the background for the display. Literature on all products will be available. *In charge—R. J. Haskin.*

• **DU PONT DE NEMOURS & CO., INC., E. I.**

Exhibit will feature "Primacord" MS connectors for short interval delay firing of blasts in open pits, the use of Thermalite Ignitacord to light rounds fired with safety fuse and caps, condenser discharge blasting machines and a number of other Du Pont products for mining use.

• **EASTON CAR & CONSTRUCTION CO.**

Display features the Easton side-dump idea in off-highway hauling. Three illuminated display stands show action photographs of six different types of Easton side-dump trailers and truck bodies. *In charge—G. D. Fraunfelder.*

• **EDISON, INC., THOMAS A.**
**EDISON STORAGE BATTERY DIV.**

Plan to display two nickel-iron-alkaline storage batteries. One is a typical battery used to power trammer locomotives and the other used to power industrial lift trucks and tractors. Construction details of the battery will be pointed up by the use of cutaway cells. There will be a visitor-operated exhibit to show that charging at many times the normal rate does not adversely affect the Edison cell. *In charge—R. H. Weeks.*

• **EIMCO CORP.**

Will exhibit their complete lines of loading machines and filtration equipment for the mining and metallurgical industries. Some of the equipment will be shown for the first time. *In charge—D. W. Saunders.*

• **ELECTRIC STEEL FOUNDRY CO.**

Exhibit will feature high alloy steel cast products for resistance to heat, corrosion and abrasion. Also on display will be a full line of dragline buckets, dippers and hoes as well as orange-peel rock-buckets, grapples and clamshell buckets. *In charge—C. E. Haney.*

• **ELECTRIC STORAGE BATTERY CO.**

Cutaway and demonstration cells of the new improved Exide-Ironclad batteries will be featured. Highlighted will be the positive plate construction with Silvium—an alloy of silver, lead and other components—in the grids, making them highly corrosion-resistant. Ample lounge and seating facilities will complete the display. *In charge —J. G. Bouska.*

• **ELRECO CORP.**

Will display fittings recently developed for aluminum conductor and for copper to aluminum change-over. Elreco roof bolting expansion shells and plugs will be exhibited, as will be several types of Elreco J hooks. *In charge—Douglas Parker.*

• **ENGINEERING AND MINING JOURNAL**

Will feature information on the world-wide metal and nonmetallic mining, milling, smelting and refining industry. *In charge—R. W. Davis.*

• **EUCLID ROAD MACHINERY CO.**

Will include both an indoor headquarters booth and a large outdoor exhibit across from the main Auditorium entrance. The outdoor display will feature 22-ton and 34-ton Euclid Rear-Dumps. The 22-ton Model TD utilizes a 300-hp Cummins engine which drives through a torque converter and torqmatic transmission. The 34-ton Model FFD has two 190-hp GMC engines mounted side by side under the hood. Each engine independently drives one of the tandem drive axles through a torque converter and torqmatic transmissions. *In charge—V. L. Snow.*

• FARMERS ENGINEERING & MFG. CO.

Femco will show some of their extensive line of heavy duty communication equipment. On display will be the Trolleyphone for locomotives, traveling cranes, and material-handling equipment; the Cagephone for deep shaft mine cages; the Adaline for power line communication; the Audiophone for large mills; and the Pagephone for communicating within offices, storerooms and factories. Most of this equipment will be energized so interested persons can observe its outstanding features. *In charge—W. P. Place.*

• FARVAL CORP.

Will have both a manual and motor-operated Farval Centralized System of Lubrication in operation. Their display will show how the system delivers lubrication to machine bearings as frequently as necessary. The exhibit will also include a backdrop upon which will be shown application photographs, a worm and gear set, and other various fittings and accessories. *In charge—D. H. Rowe.*

• FISKE BROTHERS REFINING CO., LUBRIPLATE DIV.

Using two pieces of moving equipment, the display will depict the suitability of Lubriplate lubricants for the general run of mining machinery. One of these will show the use of the lubricants operating under water. In addition, there will be large photographs and various size Lubriplate containers. *In charge—J. B. Tiernan.*

• FLEXIBLE STEEL LACING CO.

Exhibit will be built around a 20-ft inclined conveyor. The 24-in. conveyor belt which will operate slowly will present Flexco Belt Fasteners and Flexco Hinged Fasteners. New and different ways of joining belts will be illustrated and the Alligator Wide Belt Cutter and other new tools will be demonstrated. *In charge—H. J. Beach.*

• FLEXIBLE TUBING CORP.

Will display SPIRATUBE M and AYRTUBE for mine and tunnel ventilation. Live demonstration equipment will show the ease and installation speed of large diameter flexible Spiratube by one man. Other Spiratube will be connected to a mine fan to show air handling by Spiratube around turns and bends without the use of elbows or other fittings. Various sizes and types of the lightweight Flexible Tubing line as used by mine maintenance shops, smelters and assay offices will be on display. *In charge—A. H. Loux.*

• GALIGHER CO.

Will feature working models of equipment such as the Agitair flotation machine, Geary-Jennings automatic sampling machines, Vacseal rubber-lined pumps, Davis patented agitator, and ore dressing laboratory equipment. Engineers will be in attendance to explain the equipment and its practical applications. *In charge—V. D. Crocheron.*

• GARDNER-DENVER CO.

Exhibit will include hydraulic air operated jumbos, mine car loaders, air compressors, air operated hoists, drifters, stopers, and sinkers along with feed legs. Air operated sump pumps as well as air motors and pneumatic tools will be displayed.

• GATES RUBBER CO.

Is exhibiting three main products: Gates Vulco ropes, rubber-faced steel plate and mine hose. Steel balls will be dropped alternately on steel plate and rubber-faced steel plate in an operating display to compare the energy absorbing properties of each. A moving V-Belt display and static hose displays will complete the exhibit. *In charge—Joy Chiles.*

• GENERAL CABLE CORP.

Is going to demonstrate the numerous and unique qualities of Safety m.i. Wiring. Its flexibility, rigidity, permanence, and resistance to abuse, moisture, flame and vapor will be highlighted. Photographs of a number of recent installations will be displayed. *In charge—J. B. Clapp.*

• GENERAL ELECTRIC CO., APPARATUS DEPT.

Will have several new or newly designed products on display. There will be a newly designed high-torque slusher hoist motor; the new G-E motor control center; mine lighting; a service shop demonstration; a gear motor display; the new G-E mine communication system; a mine cable display; a motor approved by Bureau of Mines; and a display illustrating the new gas turbine and its application to the metal mining industry. *In charge— G. A. Re Qua.*

• GENERAL ELECTRIC CO., LAMP DIVISION

Description of Exhibit not available.

• GENERAL ELECTRIC CO., CONSTRUCTION MATERIALS DIV.

G-E Wires and Cables for the mining industry include such well known trade marks as G-E Versatol, G-E Super Coronol, G-E Flamenol, G-E Geoprene, and G-E No. 1799 Varnished Cambric. An operating display will feature these cables for all types of mining operations—coal or metal, underground or surface. *In charge—Otto Cerny.*

• GOODMAN MANUFACTURING CO.

Will show an industrial shaker conveyor which has been designed for moving special materials. Some of these materials are: hot sinter, coke, carborundum, blooming-mill scale, dolomite, hot mold sand and castings. *In charge—John D. James.*

• GOULD-NATIONAL BATTERIES, INC.

Exhibit will highlight the research and engineering background which helps to produce a top quality product in the industrial field. Gould research and engineering will be emphasized through the use of photographs, signs and displays showing battery construction. *In charge—G. F. Walsh.*

• HARDINGE CO., INC.

Is featuring a working glass model of the new Hardinge Tricone Mill. The model will illustrate grinding action and ball segregation within the mill. Also on display will be a glass model of a Ruggles-Coles Rotary Dryer and a Hardinge Constant-Weight Feeder, both in operation. Colored transparencies showing typical installations, and an illuminated flow-sheet, will make up part of the exhibit background. *In charge—F. W. Lutter.*

• HARNISCHFEGER CORP.

Will display the following equipment: an operating scale model of a P&H Excavator, large, colored translites showing P&H Electric Shovels at varied metal mining installations, an operating model of Magnetorque swing clutches, two Zip-Lift Hoists of ½-ton and 1-ton capacities, a P&H DC 300 Rectifier Welder and a low hydrogen electrode display board. *In charge—G. W. Hoskins.*

• HAWTHORNE, INC., HERB J.

Replaceable blade drilling bits for exploration drilling for the mining and oil industries will be exhibited in all sizes from 1⅞ in. through 11 in. Also shown will be a complete line of bits for diamond drilling, seismic shot hole drilling and water well drilling and samples of formations drilled. Personnel will be on hand to discuss drilling problems. *In charge—Earl M. Weaver.*

• HENDRICK MANUFACTURING CO.

Is planning to display a number of samples showing some of the developments in the screen industry. These

samples will cover their perforated, flanged lip screens, the wedge slot, and a new wedge slot development which is being used in many places for dewatering purposes. *In charge—T. A. Warner.*

• **HERCULES MOTORS CORP.**

Exhibit will feature representative engines of the complete Hercules line. Approximately 14 of the 65 models of Hercules engines and power units will be shown. A display model of the diesel model DFXH has been cut away to show the complete working mechanism of the diesel engine. This cutaway will be in operation and Hercules representatives will be on hand to point out the special features of the Hercules diesel engines. In addition, several models of the Hercules gasoline engines will be exhibited. *In charge—W. S. Humphrey.*

• **HERCULES POWDER CO.**

Exhibit will include samples of Hercules' complete set of explosives and blasting supplies. On display will be the "Hercomites"—high cartridge count ammonium nitrate dynamites; "Gelamites"—semigelatin dynamites; electric blasting caps; short period delay electric blasting caps; and the V.A.O. blasting meter. This blasting meter, introduced the latter part of 1951, is a combination voltmeter, ammeter, and blasting galvanometer for practical field use. *In charge—M. R. Budd.*

• **HEWITT-ROBINS INCORPORATED**

Will show sections of the head-drive, the intermediate and tail takeup and the heavy construction of its belt conveyor for metal mines. A heated-cloth vibrating screen, and a heavy duty scalper, able to handle rocks weighing up to 9000 lb each, will be shown in operation. Included in the exhibit will be a display of industrial rubber products such as conveyor belting and hose. *In charge—R. U. Jackson.*

• **HOUGH CO., FRANK G.**

Will feature 4-Wheel Drive and the Model HM Payloader. An electrically operated scale model Payloader will be used to illustrate tip-back and hydraulic bucket action. An added sidelight to the exhibit will be the display of toy Model HM Payloaders. *In charge—Raymond P. Wiggers.*

• **HUMPHREYS INVESTMENT CO., ENGINEERING DIV.**

Will display a full size Humphreys spiral concentrator in operation as a closed circuit test unit. A typical minus 20-mesh feed will be used so that separating action and the products can be seen and inspected. The spiral displayed will be essentially the same as those now in use throughout the world. *In charge—Merrill Welker.*

• **INDEPENDENT PNEUMATIC TOOL CO.**

Thor pneumatic rock drills will be featured in the exhibit, including sinkers, drifters and stopers. Auxiliary equipment will include power feeds for sinkers and drifters and pneumatic columns for supporting drifters. There will also be a selection of pneumatic paving breakers and a showing of various pneumatic and electric power tools for mine maintenance work, such as impact wrenches, drills, etc. *In charge—B. H. Johns and C. H. Gabriel.*

• **INGERSOLL-RAND CO.**

Two exhibits will feature recent developments in mining equipment. These include light-weight drilling equipment for use with Carset Jackbits. An interesting and timely display will cover very recent improvements in machines that expand the application and efficiency of Jackleg drilling. Other equipment includes light-weight drifters and mountings, improvements in accessories for deep-hole drilling, stopers and impact wrenches for rock bolting, Carset Jackbits, slusher hoists, centrifugal pumps and the famous Gyro-Flo Rotary Portable Compressors. *In charge—L. H. Geyer.*

• **INTERNATIONAL HARVESTER CO.**

Will utilize both indoor and outdoor space. Inside, a UD-9A power unit cutaway diesel engine will be on display. Along with this, at timed intervals, a motion picture will be shown to illustrate Service Supply's Lodover Shovel working in various mining applications. An International TD-9 crawler tractor, equipped with a front end Service Supply Lodover Shovel, will be on display in the outside area. Also shown outside will be the TD-24 crawler tractor. *In charge—C. H. Wells and C. C. Liner.*

• **JEFFREY MANUFACTURING CO.**

With its 75th anniversary as the theme, the Jeffrey Manufacturing Co. will display a 15-ft locomotive with cab, a 1½-ton Trammer locomotive, a section of belt conveyor, a 36 by 24-in. armorplate swing hammer crusher, a midget blower, an Aerodyne mine fan, electric vibrating pan feeders and chains and pillow blocks. *In charge—J. E. M. Wilson.*

• **JONES & LAUGHLIN STEEL CORP.**

Exhibit will be a graphic display featuring case histories of outstanding service records of J&L precision-built Wire Rope and Jalloy heat-treated, abrasion-resistant plate. Otiscology, a second J&L alloy will also be featured. This is a mining steel, giving high strength with less weight and particularly suited to this industry on account of its corrosion-resistant properties. *In charge—E. A. Toothaker.*

• **JOY MANUFACTURING CO.**

Will use inside and outside space to show the latest developments in equipment for mechanized mining. Included will be a display of underground mining machinery, prospecting equipment, electrical equipment, and an exhibit of machine parts and small miscellaneous mining equipment. Featured will be mechanized rock drilling units; a new diamond core drill designed to drill to depths of 3500 ft; a new diesel-electric shuttle car for underground haulage; a new air feed leg for lightweight drill machines; two new slusher hoists and a new reversible multipurpose hoist; and a new axial-flow mine fan. The shuttle car and core drill will be shown in the outside exhibit area. *In charge—O. J. Neslage.*

• **KENNAMETAL INC.**

Three-Point Rock Bits, together with regular Chisel Bits, will be featured in the exhibit. This will be strongly seconded by various other applications which include long-hole auger drilling with rotary equipment, robbing ore outcropping with heavy pronged tungsten-carbide bits and rock boring machines, larger samples in exploratory drilling with structural bits, use of special inserted twist steel with left-hand rotation drill rod for down drilling with hand hammers, and other similar applications. Approximately 20 different tool styles used extensively in the metal and nonmetallics industry will be exhibited. *In charge—E. H. Johnson.*

• **LAKE SHORE ENGINEERING CO.**

Will exhibit a working model of their new "JETO" Bottom Dump Skip, complete with dump scrolls operating in a skeleton headframe with two skips in balance. Actual loading and dumping of the skips will be demonstrated. There will also be on exhibit an end model of Lake Shore's Lohed Mine Car demonstrating the door closing and sealing arrangement to insure water-tightness. A model of cast iron base plate will also be exhibited showing the general construction and use of these plates. *In charge—P. D. Steele.*

• **LE ROI CO., CLEVELAND ROCK DRILL DIV.**

Rock drills for the mining industry will be displayed. The big feature of the exhibit will be the new Le Roi Cleveland self-leveling Mine Jumbo designed so the four-ft steel change Le Roi Cleveland HC 23 RW reverse air feed drifter can be used. Other features will be the telescopic Jack Leg for the popular 45-lb H10 Drill and the telescopic air feed leg stoper Model S 11 ST for roof support drilling or stoper raise work. *In charge—N. W. Reinker.*

• **LESCHEN & SONS ROPE CO., A.**

Will display samples of all types and constructions of wire rope used in metal mining operations, including a section of three-in. dragline rope. Various types of wire rope slings will also be available for close examination. *In charge—H. L. Waltman.*

• **LETOURNEAU, INC., R. G.**

Three major products in the LeTourneau equipment line will be on display. They are: Giant 50-ton rear dump Tournarocker pulled by a 450-hp Super A Tournapull; High-speed Super C Tournadozer (rubber-tired tractor) powered by 186-hp diesel, with torque converter and packaged, electric shift transmission; C Tournamatic Tournapull with P19 (16 cu yd) Carryall, a self-propelled earthmover which strips, hauls and dumps its load. Continuous motion pictures of equipment in action and equipment cutaways are included in the exhibit, which will occupy both inside and outside space. *In charge—S. Czerwinski.*

• **LINK BELT CO.**

Exhibit will emphasize the importance of belt conveyors for high or low capacity, long or short haulage of ores. An arrangement of belt conveyor troughing idlers—standard, rubber-tread impact and belt training, and steel roll and rubber-tread return will be shown. A double-deck 5-ft by 14-ft operating "CA" Concentric Action vibrating screen of the floor mounted type will also be exhibited, as will interesting photos of recent outstanding installations. A number of company representatives will be on hand. *In charge—L. O. Millard.*

• **LINK-BELT SPEEDER CORP.**

Principal attraction will be a fully operating, one in. to one ft, scale model of a two-yd, K-375 shovel-crane, operating with shovel and dragline attachments under simulated stripping and loading conditions. The backwall display will have as its subject a presentation of power hydraulic controls and a photo display of shovel-crane mining applications. *In charge—D. W. Lehti.*

• **LONGYEAR CO., E. J.**

Exhibit will feature diamond drilling equipment, borehole surveying instruments, and the new Arvela Magnetometer. Display boards will illustrate the company's integrated services to the mining industry—manufacture of diamond drills and supplies, contract core drilling, shaft sinking and mine development, mining engineering and geological services. *In charge—H. A. Kurtze.*

• **LUDLOW-SAYLOR WIRE CO.**

Will feature samples of Industrial Wire Cloth, Wire Filter Cloth, and a variety of square-opening and long-opening woven wire screens in its informative exhibit. Included are abrasion-resistant square-opening screens woven of inch-thick Super-Loy bars, contrasting with gossamer gauzes having 40, 60, 80, 100, 200, 300 or 400 parallel wires per lineal inch, of various corrosion-resistant metals and alloys. An interesting model will show fine-mesh wire cloth with hook-striped edges for easy application on tensioned vibrating screens—also coarser meshes for supporting and protecting the fine-mesh screens. Various styles of hook strips are shown for various types of vibrating screens. *In charge—John F. Steffens.*

• **MANCHA STORAGE BATTERY DIV., GOODMAN MANUFACTURING CO.**

Plan to have a Mancha Little Trammer in operation. The unit will be equipped with 20-cell, 15-plate lead battery in the battery box. A standard AN locomotive of the Trackmaster type, having wheels inside the frame, and a four-ton diesel locomotive with wheels inside the frame will complete the exhibit. *In charge—John D. James.*

• **MARION POWER SHOVEL CO.**

A meeting place to renew old acquaintances and make new ones. Complete description and specifications available on all Marion equipment with representatives on hand to answer all questions. *In charge—R. J. Lick.*

• **MASTER BUILDERS CO.**

Will feature abrasion tests of the Masterplate iron-clad concrete floor and ordinary concrete floors, using apparatus of the type developed by the National Bureau of Standards for determining comparative wear of all types of concrete floors. Other tests will be conducted showing the spark-resistant static disseminating properties of the Masterplate Floor. In addition there will be displays demonstrating Embeco non-shrink mortar for grouting machinery and heavy equipment and its 21 other principal uses in construction and maintenance work. *In charge—B. R. Wood.*

• **MINE & SMELTER SUPPLY CO.**

Exhibit will feature models, literature and pictures of Marcy Ball Mills, Marcy Open End Rod Mills, Wilfley Concentrating Tables, Massco-Grigsby Rubber Pinch Valves, Burt Filters, Massco McCool Pulverizer, Massco Rock Bit Grinders, Massco Laboratory, Jaw, and Gy-Roll Crushers, and the Massco Adams Density Controller. *In charge—D. J. Drinkwater.*

• **MINE SAFETY APPLIANCES CO.**

Will feature the MSA MinePhone Communication System and the Edison Model R-4 Electric Cap Lamp, the most recent electric cap lamp for the miner. In addition, the exhibit will contain the latest in oxygen administering equipment, breathing apparatus, respirators, and first-aid equipment. *In charge—D. F. McElhatten.*

• **MINING CONGRESS JOURNAL**

Monthly publication of the American Mining Congress invites the foot-weary visitor to "set and rest a while." Copies of the magazine will be available. *In charge— J. C. Fox.*

• **MINING RECORD**

Description of Exhibit not available.

• **MINING WORLD**

The lure of gold and a challenge to the miner's eye will make *Mining World's* exhibit of outstanding interest to mining men. A contest involving the estimation of the weight of a large dornick of gold-bearing quartz will award to the winner $100 in unrefined gold and to the runner-up $25 in silver. The display will feature a photographic review of many of the world's great mining operations to point up *Mining World's* staff of foreign and domestic correspondents. *In charge—M. F. Holsinger.*

• **MORRIS MACHINE WORKS**

See Universal Dredge Mfg. Co.

• **MORSE BROS. MACHINERY CO.**

Will show the Laboratory 2-cell Flotation Machine, embodying all the latest principles of Morse Jetair Flotation. Also exhibited will be a laboratory size Morse

"Trueline" Classifier. These exhibits will be in operation, enabling the visitor to see the simplicity of design and operation of these machines. Also on exhibit, for the first time, will be a model of the Morse "Concentric" Thickener. This will be the first showing of this new style thickener, ideal for metallurgical and chemical installations. *In charge—H. N. Grimes.*

**• MOSEBACH ELECTRIC & SUPPLY CO.**

Display features a complete line of trolley line material, power rail bonds, also the MESCO shock absorber and MESCO hydraulic brake adjustor. Several new items such as signal bonds, coil wound resistance, resistance welders and choke coils will be shown for the first time. *In charge—J. C. Loy.*

**• MURPHY DIESEL CO.**

Exhibit will center about a 6-cylinder radiator cooled, skid mounted power unit and one 100 kw radiator cooled, skid mounted generator set, and will also include working models of the injector, micro-control governor, cylinder head and camshaft assembly, oil pump, water pump, and a cutaway view of the connecting rod and piston of the Murphy Diesel engine. *In charge—Paul Schnetzky.*

**• NATIONAL FUSE AND POWDER CO.**

Will show the various brands of safety fuse manufactured by National Fuse and Powder Co., with a brief summary concerning the advantages of each brand. Blasting accessories will be displayed, including Pull Wire Fuse Lighters, Hot Wire Lighters, Lead Spitter, National Fuse & Cap Seal, Ignitacord, and Thermalite. *In charge—V. R. Martin.*

**• NATIONAL MALLEABLE AND STEEL CASTINGS CO.**

Features the company's NC-1 Truck for mine cars and the new Reduced-size Willison Automatic Coupler for small cars. In addition the NC-1 Truck (which incorporates the oscillating-control mechanism of National's larger C-1 railroad freight truck) will be fully equipped with a regular-size Willison coupler and National rubber cushioned draft gears to meet varied car construction and load requirements. Also, shown in the booth will be National's steel pallets for sintering machines, and steel ore-grinding balls. *In charge—H. H. Smith.*

**• NORDBERG MANUFACTURING CO.**

Exhibit will be chiefly centered around operation scale models of the "Symons" Cone Crusher and "Symons" V Screen. In addition Nordberg will also display a section of the "Symons" Rod Deck Screen and large photo murals showing other types of Nordberg machinery for the basic processing of ores and minerals. Included in the exhibit will be a wing panel photo display of typical installations of Nordberg machinery. *In charge—J. D. Grace.*

**• NORTHWEST ENGINEERING CO.**

Will display colored photos of excavating and material handling machinery in the mining field. *In charge—G. C. Williams.*

**• OHIO BRASS CO.**

Will have a complete display of modern high speed overhead trolley wire fittings, fittings for aluminum as well as copper feeder cable, rail bonds, and locomotive collector equipment. New fused taps, ground clamps, and other safety units of this type, including motor starters and distribution boxes. O-B will also include a display of roof support expansion shells and plugs especially designed for roof bolting together with accessories developed to aid in the proper installation of these units. *In charge—J. H. Sanford.*

**• OIL WELL SUPPLY DIV., U. S. STEEL CO.**

See United States Steel Co.

**• OLIN INDUSTRIES, INC.**

Will feature a representative display of dynamites and blasting caps. Dominating the exhibit will be a special unit carrying samples of the various types of blasting caps manufactured by Western Cartridge Co., and samples of dynamites manufactured and distributed by the various Olin explosives plants. *In charge—A. J. Barocca.*

**• PENNSYLVANIA CRUSHER CO.**

Will exhibit models and photographs of Pennsylvania's line of crushers including Impactors, Hammermills, Dixie NON-CLOG Hammermills, Granulators, Bradford Breakers, Single Rolls, Jaw and Gyracone Crushers. *In charge—R. A. Adams.*

**• PIONEER ENGINEERING WORKS, INC.**

Will exhibit a complete model crushing and screening plant. This plant, built to ¼ scale, is fully operative and material will actually be crushed and screened. The units in the plant are: A Pioneer Oro Manganese Steel Feeder, size 48 in. by 12 ft; a 24-in. by 36-in. jaw crusher, a 40-in. by 22-in. triple roll crusher, a 4-ft by 12-ft two-deck vibrating screen and necessary conveyors. The model plant is authentic in every respect, including bearings, adjustments, mountings, etc. *In charge—W. A. Rundquist.*

**• PRODUCTIVE EQUIPMENT CORP.**

Will exhibit a 4-ft by 10 ft, 2-deck Suspended GYROSET Vibratory Screen for sizing, wet or dry, and dewatering. The GYROSET is a two-bearing positive eccentric screen with adjustable throw for different materials and operations. *In charge—L. H. Lehman.*

**• RAYBESTOS-MANHATTAN, INC.**

Will exhibit industrial rubber products, particularly conveyor belting and hose used in mines. There will be an underground mine conveyor in operation to display a new type of belt. Samples of Homocord and Ray-Man "F" Conveyor Belts for general heavy-duty conveyor service and Ray-Man Tension Master Belt for high lift, super-tension duty, and Safety Trolley Wire Guard for protecting workers from mine car trolleys will be shown. *In charge—A. L. Hawk.*

**• ROCK BIT SALES & SERVICE CO.**

On exhibit for the first time at the Rock Bit Sales & Service booth will be Long Hole Drilling Tools—for drilling holes varying in depth from 20 to 150 ft, for use with standard percussion-type rock drills; also 4-point Intra-Set carbide tipped drill steel. In addition, detachable, tungsten carbide Rok-Bits, Intra-Set carbide tipped alloy drill steel, and all types of Hollow Drill Steel; Hole-Savers, etc., will be shown. *In charge—John Neamand.*

**• ROEBLING'S SONS CO., JOHN A.**

Will exhibit a complete line of wire ropes and electrical wires for the metal mining field. Hoist, shovel and dragline ropes will be the main feature of the exhibit, along with portable power cables for general metal mining use.

**• SANTA FE TANK & TOWER CO.**

Plan to have scale models of wood tanks used in the mining industry. In addition, a slide projection machine will be used to project colored photographs of wood tank

installations in the mining industry and for water storage purposes, wood stave pipe installations, Redwood gas washers, and various Redwood cooling tower installations of the mechanical draft type. *In charge—L. R. Obert.*

• **SERVICE SUPPLY CO.**
See International Harvester Co.

• **SHEFFIELD STEEL CORP.**

Will use a colorful globe, showing the world in relief, to dramatize the use of Sheffield Moly-Cop Grinding Balls around the world. Bright colored pennants mark countries to which these grinding balls are shipped. This display is painted in fluorescent colors and lighted from one side with black light and incandescent light from the other, giving the impression of day and night. The background for this display is decorated with four colored translights, depicting Sheffield plants and operations.

• **SIMPLEX WIRE & CABLE CO.**

Exhibit will consist of samples of insulated wire and cable. The background for the booth will be large photographic murals showing portable cords and cables in use in the metal mining industry. *In charge—E. J. MacKenzie.*

• **SIMPLICITY ENGINEERING CO.**

A 12 ft long section of a Model VS-12 Simplicity Oscillating Conveyor will be displayed. Also in operation will be a show model of the os-a-veyor unit, with material circulating from one section to the other in continuous movement. *In charge—R. C. Johnson.*

• **SOCONY-VACUUM OIL CO., INC.**

Exhibit will stress "The Importance of Planned Lubrication Maintenance" in effective metal mining operation. A three-point program will be offered: including selection and application of minimum number of correct lubricants; development of a sound lubrication schedule; maintenance of proper storage and handling of lubricants. Special attention will be focussed upon the requirements of rock drill and mine car lubrication. *In charge—C. J. Copley.*

• **SOUTHWESTERN ENGINEERING CO.**

Exhibit will be arranged primarily as a lounge and coffee will be served. On hand for discussions of latest methods in design engineering and construction will be members of the SWECO staff. In addition, a new and radically improved screen will be on display. *In charge—H. V. Hughes.*

• **STEARNS MAGNETIC, INC.**

Will present a photographic exhibit featuring magnetic equipment for concentration, beneficiation and tramp iron removal. A laboratory model magnetic separator will be in operation. The booth is particularly designed to give guests a place to relax and discuss operating problems with company representatives. *In charge—R. H. Koehler.*

• **STEARNS-ROGER MANUFACTURING CO.**

Display will consist of pictorial illustrations and representation of Stearns-Roger's far-flung activities in engineering, equipment and construction for the mining industry. Also featured will be the "Utiliscope," a development of television for installation in mine, mill and factory. The "Utiliscope" will be a live demonstration, operated continuously during exhibition hours. *In charge—D. L. Clow.*

• **STERLING STEEL CASTING CO.**

Exhibit will consist of all types of Sterling Cast Steel balanced design ore car wheels plus a miniature haulage system equipped with ore cars to demonstrate the Sterling Cast Steel balanced design ore car wheels. Miscellaneous castings for the ore mining industry will also be displayed. *In charge—F. E. Rhine.*

• **STOODY CO.**

Will have on display a number of rebuilt and hard-faced pieces of equipment commonly used in the mining industry. The live exhibit will consist of a small Leader Automatic Welding Machine in operation. At frequent intervals, this machine will be demonstrated, rebuilding and hard-facing sample parts of mining equipment with Stoody Automatic Wires. *In charge—Ralph S. Thompson.*

• **TALCOTT, INC., W. O. & M. W.**

Will exhibit a complete line of the Talcott Conveyor and Clinching Belt Fasteners for all types and sizes of flat rubber transmission and conveyor belting. Featured in the exhibit will be the Acme Patch Fastener for performing emergency repairs to all types of belting. *In charge—M. W. Talcott.*

• **TEXAS CO.**

Exhibit will consist of various products applicable to the mining industry. Literature relative to the operation and maintenance of mining equipment from the standpoint of lubrication will be distributed. *In charge—G. W. Johnson.*

• **THOMAS FLEXIBLE COUPLING CO.**

Description of Exhibit not available.

• **TIMKEN ROLLER BEARING CO.**

Will feature Timken rock drills. These are of two kinds, the multi-use and the carbide insert type. In addition to the removable rock bits, they will also have a display of Timken bearings for use in all types of metal mining equipment. A small display of Timken steel and seamless steel tubing will also be included. *In charge—K. W. Powers.*

• **TOOL STEEL GEAR AND PINION CO.**

Exhibit will consist of cross sections of hardened gears, pinions, sprockets, shafts, rolls, and other products used extensively in the metal mining industry. *In charge—J. C. Seeger.*

• **TRAYLOR ENGINEERING & MFG. CO.**

Exhibit will include photographs and a visual display of jaw and gyratory crushers, grinding mills, feeders, kilns, coolers, and dryers. *In charge—C. H. Roberts.*

• **TWIN DISC CLUTCH CO.**

Will display a plastic working model of the Twin Disc three-stage hydraulic torque converter as currently being used in heavy construction machinery and off-highway trucks. Additional display units will show aluminum hydraulic couplings, Hydro-Sheave drives, friction clutches, and hydraulic power take-offs. Near life size cutaway drawings of these same units will form an integral part of the exhibit backdrop. In addition, district and factory personnel will be on hand to discuss design features and performance data with the aid of a Vu-Graph machine and picture screen. *In charge—W. E. Sterling.*

• **TYLER CO., W. S.**

Will feature the electrically-heated Ty-Rock Screen, which is used for screening damp ores. Samples of Woven Wire Screens of many different metals and meshes, along with a Ro-Tap Testing Sieve Shaker and Tyler Standard Screen Scale Testing Sieves, will also be exhibited. *In charge—J. L. Peterson.*

• **UNION CARBIDE AND CARBON CORP.**

Will display Hastelloy Alloy parts used to combat corrosion, tungsten carbide inserts for detachable rock drill

bits, hard-facing materials, and wear and heat resistant half bushings and castings. Also shown will be Linde Air Products Co. processes and products for maintenance and repair of mine equipment, including braze-welded mine rails, parts flame-sprayed with polyethylene for corrosion resistance, and Union-Melt build-up of wheels and rolls. *In charge—W. D. Hooper.*

• **UNION WIRE ROPE CORP.**

Will show samples of 11 different types of Tuffy Slings. Also displayed will be samples of Tuffy slusher rope, hoist rope and Tuffy drag and scraper rope. *In charge—R. B. Boand or R. G. Noble.*

• **U. S. BUREAU OF MINES**

Description of Exhibit not available.

• **UNITED STATES STEEL CO.**

Exhibit will feature products of American Steel & Wire Division, Columbia-Geneva Steel Division, United States Steel Co. These will include wire rope, special alloy steels, roll plate liners and liner bars, aerial tramways, mine rails and ties, rail bonds, floor plate, corrugated roofing and siding. Of special interest will be the Lorig Aligner, which embodies new engineering principles. Three operating units, showing varied applications, will be on display. *In charge—C. B. Crawford.*

• **UNIVERSAL DREDGE MANUFACTURING CO.**

A newly developed Universal air trammer, which operates from a receiver storage of compressed air, will be shown. The locomotive air supply comes from the normal 100-lb mine air compressor. Company representatives will be on hand to answer questions about the air trammer. *In charge—Albert Hack.*

• **VASCOLOY-RAMET CORP.**

A complete line of carbide tipped mining tool bits including various sizes of masonry drills will be shown on a 16-ft display counter. These will include chain cutter bits (for use on continuous miners), hand held auger drills, post mounted auger drills, machine mounted auger drills, roof drills, finger bits, and masonry drills. Complete literature including catalog and price lists will be available. *In charge—R. O. Moore.*

• **VICTAULIC CO. OF AMERICA**

Will display Victaulic Pipe Couplings ranging from ¾ in. through 60-in. pipe sizes, its complete and varied line of modern Full-Flow elbows, tees, reducers, fittings and plug valves; Vic-Groover pipe tools in size ¾ in. through six in. which are automatic as to groove positioning and depth; and Roust-A-Bout Couplings for plain end pipe applications.

Several new developments will be demonstrated including the operation of Vic-Groover Tool with air motor drive, and the adaptation of a standard pipe and bolt machine for simultaneous cutting off and grooving of pipe ends.

A new Victaulic header arrangement complete with Victaulic Plug Valves for simplified connection of hoses will be featured. Other operating units carrying air and water pressure and demonstrating the Victaulic Method of Piping for all mine and mill pipe systems. *In charge—R. W. English.*

• **VULCAN IRON WORKS CO., INC, THE**

Exhibit will consist of several large scale photographs of recently manufactured heavy duty mine hoists now in service in this country and abroad. Accompanying this photographic exhibit will be supplementary pictures and information covering the individual hoist specifications. Also on exhibit will be the Portocut Air and Portocut Electric Chain Saws, especially designed for easy one man operation in mine timber cutting and framing. *In charge—C. H. Chase.*

• **WAUKESHA MOTOR CO.**

Features three Waukesha diesel engines, of 1197, 779, and 426 cu in. displacement. Also shown will be illuminated display panels mounting various diesel engine parts, and an illuminated colored "Translight" display depicting various applications of Waukesha power. *In charge—J. G. Swain.*

• **WESTERN GEAR WORKS**

Will display a complete line of mechanical power transmission equipment and gears especially designed for application in the mining industry. Several different styles of speed reducers (parallel and right angle shaft) gear motors, couplings, torque converters, etc., will also be shown. *In charge—M. P. deRegt.*

• **WESTERN MACHINERY CO.**

Will include a WEMCO S-H Classifier, Fagergren Flotation Machine and WEMCO Sand Pump. Machines in operation will be a Laboratory Fagergren Flotation Machine, a laboratory model of the new WEMCO Attrition Machine, and a scale model of a heavy media unit employing a WEMCO Drum Separator constructed of lucite to clearly illustrate the principle of operation. *In charge—R. W. Hernlund.*

• **WESTERN ROCK BIT MANUFACTURING CO.**

Will display, for the first time, the Liddicoat Tungsten Carbide Insert Bit. This bit is forged with the Liddicoat socket connection. There will also be displayed the various types of Liddicoat steel bits, and latest type of accessories for preparing drill rod for the Liddicoat bit. *In charge—Maurice W. Hawkesworth.*

• **WESTINGHOUSE ELECTRIC CORP.**

Exhibit will be highlighted by a pantomine show, portraying the benefits that can be derived by the mining industry in letting Westinghouse fill their needs on electrical apparatus, engineering help and servicing facilities. Three "new" pieces of electrical apparatus, specifically designed for the mining industry, will be shown (a) portable switchhouse, (b) portable mine power center, and (c) portable selenium rectifier. In addition, exhibits on control centers, linestarters, ac mining motors, gearmotors, and a mining type battery locomotive will be available. *In charge—J. R. Fulton.*

• **WHITE MOTOR CO., STERLING DIV.**

Will have two exhibits, one inside and one outside. A White gasoline engine and a working model of the Sterling-White Super-Traction Differential will be displayed at the inside exhibit. The gasoline engine features an intake manifold with metered ports for each cylinder, dual exhaust manifold system, high lift intake valves, sodium cooled valves and hydraulic valve lifters. The differential has very few working parts and divides the amount of tractive effort in proportion to wheel traction. An off-highway dump truck, with fixed planetary gear type rear axle, will be shown at the outside exhibit. *In charge—B. M. Myhre.*

# *The Grand Canyon*

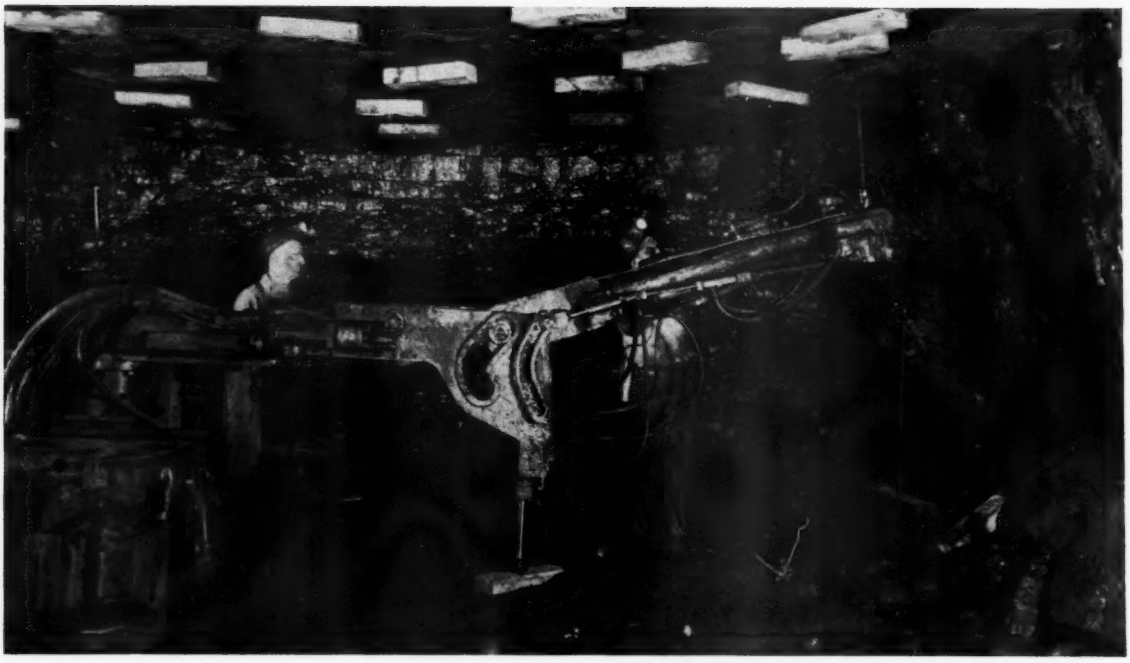
In a glamorous land on the top of the world
Where the sky is an endless blue
A wedge of heaven has driven deep
And split the earth in two,
And torn its face in a jagged wound
All splotched and stained with blood
That long since poured from its riven veins
In a surging ghastly flood.

I stood one day and gazed in awe
At that gaping, beautiful gash
That stretches from dawn to the setting sun
Like the trail of a dragging lash;
And I looked for miles to its deepest depths
To behold with wondering eyes
The sinuous edge of that mighty wedge
That still presses down from the skies.

Then I trembled to think of the fearful powers
That buffet the world and me,
And I pitied the earth that since its birth
Has suffered so patiently;
But then I began to understand
How a life is shaped and steeled,
And made both rugged and beautiful
By the scars where its wounds have healed.

—Marion Dwight Harbaugh

The above poem, inspired during a stopover at Grand Canyon on returning from the AMC San Francisco meeting in 1934, reflects a side of "Doc" Harbaugh that many of his friends in the mining industry never knew. It is presented here as a memorial to a great, though modest and unassuming mining man. We know it will round out the memories of "Doc" Harbaugh in the minds of his many friends in the industry which he served so long and well.



Bolts are set in an arc roughly paralleling the face

# Wet And Dry Roof Drilling

**Use of Water with Rotary Drills and Dust Collectors with Percussion Drills Solves Health Hazards In Unconventional Manner**

## Wet Drilling with Electric Rotary Drill

By LOUIS F. LUMAGHI
President
Lumaghi Coal Co., St. Louis, Mo.

THE Lumaghi Coal Co. is using roof bolts in one section of its mine near Collinsville, Ill. The seam here is eight ft thick and lies nearly level. In the section using bolts, all equipment is track-mounted, the coal being loaded by Goodman loaders and cut by slabbing machines making an eight-ft cut. Entries are driven 14 ft wide and rooms and room crosscuts 24 ft wide. Pillars are not recovered.

Roof consists of five to eight ft of laminated black slate overlain by a strong limestone. In rooms where the slate is good it can be supported with 14-ft bars set on 4-ft centers with a prop on each side between the end of the bar and the rib. When the slate is bad, bars must often be set at half this spacing. It is necessary to set heavy collar bars at turnouts, sometimes as large as 18 ft long and eight-in. at the tip.

Bolting is done with a Jeffrey roof drill which pulls a trailer carrying a 300-gal water tank and a rack for bolts. There is a small turbine pump at the rear of the trailer for supplying water to the drill. The drill stem is a $1\frac{5}{16}$-in. diameter plain steel tube with a 0.30-in. bore. One-and-three-eighths-in. Kennametal drill bits are attached to the drill steel with a cotter key. Water is directed to the point of the drill and also comes out through the holes for the key. The $\frac{3}{4}$-in. bolts are 48 in. long, with rolled threads and square flashed heads. Ohio Brass shells are used with pal-nuts to hold the shell together when inserting in the hole. To bear against the roof a 3-in. by 6-in. by 18-in. oak block with a $\frac{3}{4}$-in. malleable iron washer over the head is used.

After a place has been loaded out, the roof is examined and safety props set if needed, but this is rarely necessary. Then track is laid up to the face and the roof drill brought in. The operator swings the head to the left rib and positions it two ft from the rib and four ft in-by the last bolt. He drills the hole, then swings to the right four ft, drills another hole, and so on along the arc of the swing until he gets to within two ft of the right rib. Meanwhile his helper has been assembling the bolts and putting them up into the holes.

When the last hole is drilled the drill steel is removed and an extension wrench is placed in the tightener socket of the machine. The bolt is pushed up by the drill arm until the wood block is seated and then turned by the machine until is is so tight that the hydraulic motor in the head stalls,

as the relief valve opens. After the last bolt is set in the row, the machine is trammed forward four ft and another curved row of bolts set against the face. This is the only roof support provided in the entries, but in the rooms a line of props, eight ft apart, is carried on each side of the track. The last cuts in rooms and crosscuts are propped, not bolted.

The socket holding the drill turns at 413 rpm and the tightener at 206 rpm. At this speed it develops 225 ft-lb of torque with a hydraulic pressure of 1300 lb. A torque wrench is kept in the section and the bolts are tested periodically by the foreman. The bolts when tested average about 170 ft-lb of torque. It has been noticed that the torque lowers as the bolt becomes older. It is believed this comes from using unseasoned oak blocks which tend to shrink and arrangements are being made to season the blocks before using them.

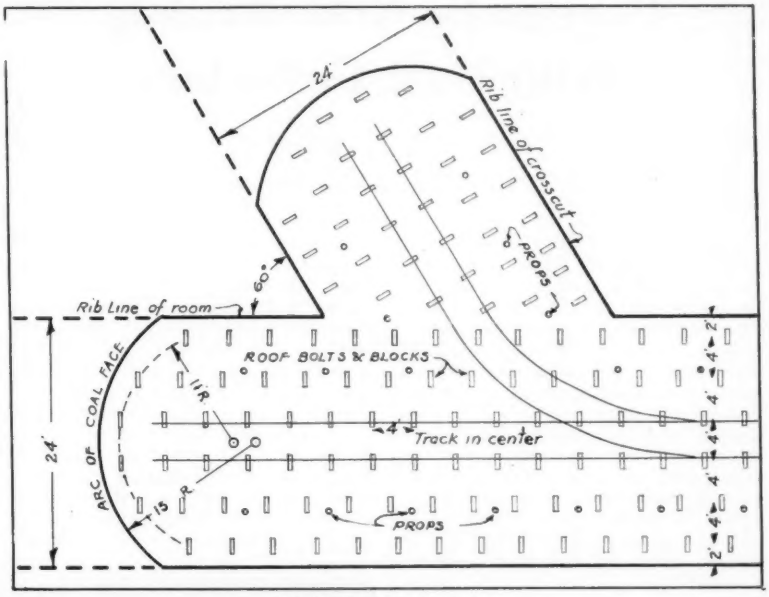
## Operating Results

Coal is produced in this section on two shifts, but the roof drill is operated on all three shifts. The drill usually gets behind by the end of the second shift, and the third shift is spent in catching up; putting in extra bolts where the slate or top coal has broken around a bolt; tightening old bolts, and similar work. During the third shift the trailer is also loaded with water and bolts; the machine is greased and everything prepared for the next day. There are six men each day on the drill and the equivalent of one man for the two producing shifts setting props, or a total of seven men. These replace an average of 12 timbermen. In February the bolted section averaged 982 tons of washed coal per day, with an average of 213 bolts per day, or 4½ tons per bolt.

This section has been on roof bolts since July, 1951. There were some difficulties at first. The most serious one was the tendency of the cuttings to form a mud which stuck the drill stem in the hole. This was overcome by using bits with grooves in the side to carry the water down and out of the hole, and by reducing the drill speed from the oroginal 825 rpm to the present 413 rpm. Occasionally the shell will fail to grip in a soft spot in the slate, and another hole has to be drilled. A few 60-in. bolts are carried on the machine for use at these times, as a four-ft bolt inserted near the bad bolt would probably not grip either. The longer bolts are also used where the top coal sticks to the roof, cutting down the effective length of the standard bolt. Three-eighths by six-in. square plates were first used against the roof, but the change to oak blocks was made because of the better bearing on the roof possible with the larger pieces. It is also easy to hang cables from nails driven into the blocks where desirable.

## Favorable Roof Action

There has been one roof failure in the bolted area. The first indication of failure was the appearance of cracks in the slate between the blocks and the roof sounded "drummy." The place was allowed to stand idle for observation for 10 days; then the number of roof bolts was doubled and nine cross-bars and one collar bar were set over a 32-ft length of the room. In spite of this the place continued to show excessive weight and 13 days after the bars were set the roof caved to the limestone. The slate here was 58 in. thick. The action was identical with that in timbered places, which always cave to the limestone eventually, and frequently fail before they are finished. It is expected that as the slate weathers other bolted places will also cave, although with this one exception none have yet done so. Other failures with bolts experimentally installed in another section gave at least as much warning as do timbered places. Bolts have been very successful keeping the top tight at the working face, as there is never more than eight ft of roof span left open.




Roof bolt pattern in rooms

## Dust Abatement

This type of installation was selected because the company had successfully used rotary drilling in sinking a slope, which went through several hard limestones as well as shale. Some roof bolts were installed around the shaft bottom with the same drills, but dry drilling produced a bad dust condition. On analysis the cuttings showed from 11 to 52 percent free silica content, a serious health hazard which is remedied by wet drilling. The water also keeps the bit cool and increases its life. A little less than two gal of water per hole is used. The drill bits average 14 holes before getting dull, and can be resharpened 15 or 16 times.

This summer another section of the mine will be put on roof bolts. The new area is a trackless section with a Joy mechanical loader and shuttle cars. The same type of roof drill arm as described above will be installed on a Joy timbering machine, which is large enough to carry a water tank and a supply of bolts. It will be necessary to alter the cycle in this section, because the fire clay underlying the coal is soft and porous and if wet makes a mud through which shuttle cars cannot operate. Present plans call for cutting the places before bolting them. The cut is made about 1½ ft above the bottom leaving the cuttings spread under the area to be bolted. It is believed that water from the roof drilling will be largely absorbed by the cuttings and not enough will get into the clay to hurt.

## Costs, Operating Advantages and Safety

In this mine there is also a producing section with identical equipment and conditions where the roof is supported by conventional timbering. In February, 1952, the labor cost in the timbered section was six cents per ton higher than in the bolted section, but the timber cost was 15.4 cents, as compared to a cost of 24.9 cents for bolts, drill bits, drill parts, and props in the bolted section. This made a cost differential of 3½ cents in favor of the timbered section. However, the daily tonnage in the timbered section was 34 tons higher than the bolted

section. Reduced to an equal tonnage basis, the differential would have been only 0.6 cent per ton in favor of timbering.

There are other savings in using bolts, which are not shown in the above figures. The cost of delivery from the surface to the face is lower. There is no loose coal lost behind the timbers, which decreases the work of coal preparation, increases extraction, and makes it easier to do an effective job of rock-dusting. To produce the same tonnage as in the bolted section, it is necessary to clean up one more place each shift in the timbered section. There is plenty of room to store rails and props and ample clearance around the cars and machinery. Against this must be figured the cost of power, water, and amortization of the first cost of the drill.

Finally, there is a great reduction in accidents. Since starting to roof bolt there have been two reported injuries with 2½ hours lost time on the drill and none by falls of roof in the bolted area. In the corresponding period, the timbered section reported 17 injuries from timbering or falls of roof, of which two were lost-time accidents with a total of 42 days lost.

Although management at Lumaghi has not yet been able to show much saving in cost, it is felt that roof bolting has been successful, on the whole, and the practice will be extended over the whole mine.

# Pneumatic Roof Drilling With Dust Collectors

By C. E. LINKOUS
Director of Safety
Island Creek and Associated Coal Cos.

ISLAND Creek Coal Co. introduced roof bolting in its mines during the early part of 1949, using conventional air equipment, including track-mounted compressors, stopers and impact wrenches. Approved-type respirators were used in the initial installations which were along haulageways. After considerable experimentation, the company decided to extend roof bolting to the productive faces and since the men would be exposed for prolonged periods, other measures besides respirators to protect the workmen or to reduce the dust hazard had to be taken. Roof in the Cedar Grove, Lower Thacker, Eagle, No. 3 Elkhorn, Pocahontas and Beckley seams was known to contain free silica ranging from 7 to 55 percent; therefore, in addition to the dust nuisance there was also a definite silica hazard.

## Technology Has Lagged

Even though the need for dust control in conjunction with drilling for roof-bolts was recognized from the beginning, development of equipment lagged. This was, in part, brought about by Article IX, Section 1b, of the Mine Safety Code which states: "Rock drilling with percussion drills shall be done wet, etc." Therefore, manufacturers have been somewhat reluctant to go beyond the experimental stage with dust-collecting equipment. However, the U. S. Bureau of Mines has now set up a schedule for testing this type of equipment and the development of suitable equipment should be rapid when formal approval is issued and this section of the code is revised so as to permit the use of dry dust collectors with pneumatic drills.

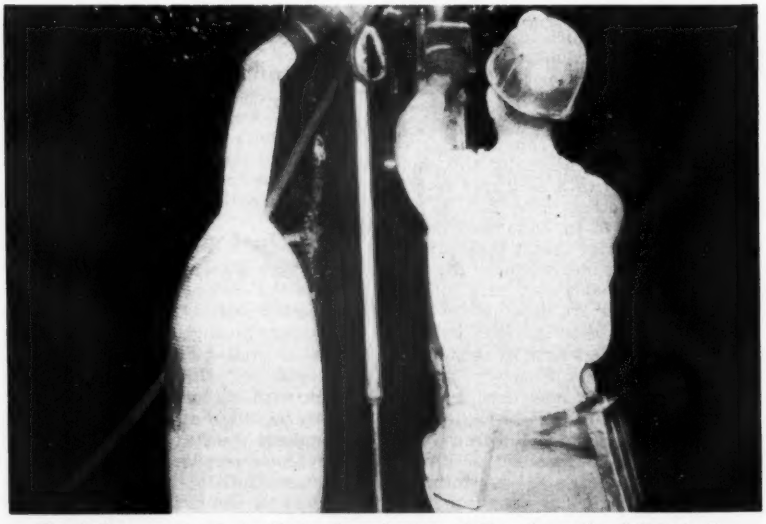
The U. S. Bureau of Mines recommends: "In bituminous mines, the average full-shift concentrations of atmospheric dust to which a workman may be exposed should not exceed 20 million particles per cubic foot of air, and a maximum concentration for any single operation should not exceed 40 million particles of dust per cubic foot of air. When the dust contains silica, *not more than 5 million particles of silica dust per cubic foot of air* should be present in the above limiting concentrations."

Although dust can be controlled in pneumatic percussion drilling, every mine operator knows that the most efficient and best designed machines in the world for dust control will not give desired protection if not properly maintained and used religiously. Since it is evident that wet drilling and dry-dust collectors give extremely good dust suppression, considerable attention must be directed towards ensuring that equipment is properly maintained and used in practice so that potential protection is not wasted.

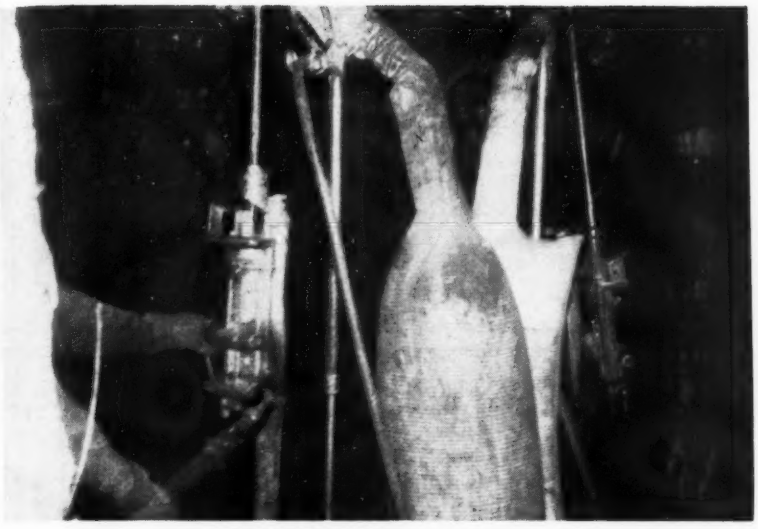
## Wet Drilling Methods

At first thought it would seem that controlling the dust from rock drilling should be a very simple matter and at the same time not too expensive. It is quite simple to use water in horizontal drilling as the dust is trapped in the hole and then washed out the collar of the drill hole. However, the drilling of roof-bolt or vertical holes presents several problems solution of which, in many instances, is expensive.

The common method, which also appears to be the best, of forcing water through the hollow drill steel, at a pressure of approximately 60 psi, is used by Island Creek. Successful dust control by this method depends principally upon maintaining the flow of enough water through the drill, using water continuously during the entire drilling operation, and yet not waste any. Naturally, high dust concentrations will result if insufficient water is used. It is imperative that adequate pressure be maintained so that a full flow of water is available. However, this method is opposed by most drillers as a very "messy" operation because they are continually being sprayed with the mixture being discharged



The driller uses the dust collector throughout the drill cycle, getting full protection



**Visible dust is kept to a minimum**

from the holes. In addition, it is almost impossible to get drillers to use water voluntarily when starting or "collaring" the drill hole. It is also true that wetness underfoot is particularly objectionable to the drillers and the water has an adverse effect upon much mine floor.

## Eliminate Clogging

The company has found that 40 to 50 psi water pressure and 90 psi air pressure eliminates most of the "clogging," generally due to the drillers being too economical with water. The method of providing water for wet drilling varies at individual mines but the oldest and most common method is the use of water tanks.

A normal crew, where percussion drilling is practiced and either water or dust collectors are used, consists of three men, two of whom operate stopers and one who assembles, installs and tightens the bolts with an impact wrench. Generally, a crew of three men will install 110 to 120 bolts, 42 to 48 in. long, in a shift. It must be understood that this varies according to the nature of the roof and concentration of working places. Each crew is provided with a track truck, rubber-tired cart or bolt carrier which, with one exception, is manually operated. Thickness of the coal, type of mining, etc., dictate the type of equipment used.

## Central Compressor Station Used

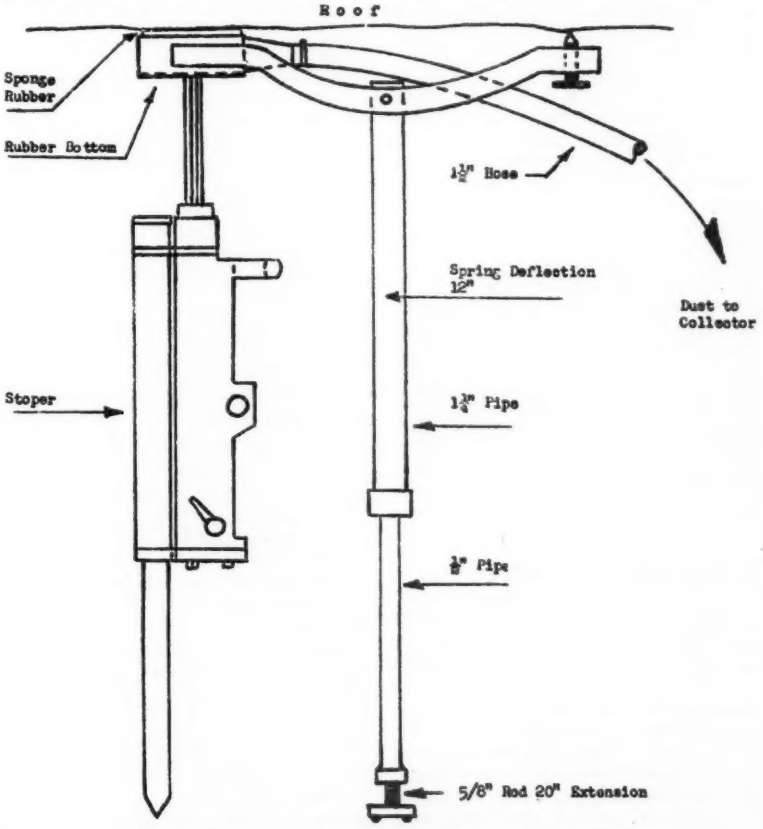
Almost without exception, air is piped from a compressor station on the surface to the working faces. Roof-bolting mines are provided with 1100 cfm stationary compressors. Underground distribution of the compressed air is through three, five, or six-in. mains to the entrances of the sections and thence through two-in. lines to within at least 100 ft of the working faces.

Impinger samples have been collected in working places, where drilling was done wet, and in all instances the average maintained was about half of the permissible maximum. For example, the average of six sets of samples taken, where wet drilling was practiced, showed 10.9 million particles per cu ft while an average of 20 million particles per cu ft is considered a safe working atmosphere.

## Dry Dust Control

With safety being the first consideration, Island Creek made trial installations of at least four different types of dust collectors produced commercially and others that were developed locally. After considerable experimentation to secure the desired features in a dust collector and at the same time be able to work this additional phase of the roof bolting operation into the mining cycle, it was decided to standardize on a collector developed locally.

At the present time more than 50 of these dust collectors are being used and all have given very satisfactory results. The size, weight and portability of this collector is a great advantage as one man can move it about and set it up with ease. Its operating principle is similar to that of most of the numerous dust-collecting devices. An air jet creates a vacuum at the collecting head and the mixture of air and dust is conducted to a canvas bag. This bag filters out the dust received from the collecting head. The device used to collect the dust from the collar of the hole is a




**Sketch of stoper and dust collector in operating position**

do-nut affair held in place by a leg similar to the one on the stopers. The collecting head is provided with an easily replaceable sponge-rubber gasket to afford an adequate seal. There is a tight rubber seal at the bottom of the head where the drill steel passes through during drilling operations. Both seals are vital to the dust-collecting efficiency and also govern the performance of other parts of the collector. Constrictions are kept to the absolute minimum and every effort has been made to utilize the effect of gravity in removing the drill cuttings from the hole.

## Results of Wet and Dry Drilling

A recent dust survey conducted where dry collectors were being used revealed that the dust concentration at the breathing zone was less than 5 million particles per cu ft and the silica content was slightly less than 50 percent. Thus the free silica was slightly more than 2 million particles per cu ft.

Management at Island Creek is convinced that dust collectors will do a far better job than wet drilling in controlling dust produced by pneumatic percussion drilling. In addition they have found that the dust collectors are used throughout the drilling operation, including collaring of the hole, and that employes are actually realizing full-shift protection.

The cost of dust to the coal mining industry from drilling in rock cannot be exactly estimated as it is far more than can be expressed in terms of dollars and cents. Besides the health hazard, the dust is a nuisance. The discomfort which it undoubtedly causes and its effect upon illumination and safety have a direct influence on the morale of employes and hence must be reflected in reduced efficiency.

Since either method of dust control, if properly applied, gives favorable results and can be employed without interfering with the mining cycle, the comparison between the wet drilling and dust collectors then becomes a matter of cost. The analyses to follow compare the costs of the two methods.

## Costs

*I. Initial Cost of Installation*

**A. Dust Collecting**

(1) Initial cost of collectors of the type being used is approximately $150 each. Each section requires two collectors at a cost of $300 per section.

(2) An additional collector should be provided to every two sections as a spare. This requires an estimated additional $75 per section.

(3) Additional pipe, hose, etc., are estimated to cost about $25 per section.

SPEED WITH WATER DRILLING

| Operation | Number bolts or places | Total minutes | Minutes per bolt or per place |
|---|---|---|---|
| Prepare to drill | 8 Places | 22.4 | 2.8/Place |
| Drill | 54 Bolts | 122.7 | 2.3 |
| Reset stoper | 54 Bolts | 32.5 | .6 |
| Prepare to tram | 8 Places | 23.4 | 2.9 |

*Summary*

Normal time per place, 5.5 min. Normal time per bolt, 3.1 min.
At eight bolts per cut the time per place is:
3.1×8=24.8+5.5=30.3 minutes/place bolted.

DRILLING SPEED WITH DUST COLLECTOR

| Operation | Number bolts or places | Total minutes | Minutes per bolt or per place |
|---|---|---|---|
| Prepare to drill | 8 Places | 11.6 | 1.5/Place |
| Drill | 72 Bolts | 163.4 | 2.3/Bolt |
| Set dust collector and reset stoper | 72 Bolts | 18.6 | 0.3/Bolt |
| Empty dust bag | 9 Places | 8.6 | 1.0/Place |
| Prepare to tram | 9 Places | 8.9 | 1.0/Place |
| Insert and drive bolts | 72 Bolts | 32.2 | .5/Bolt |

*Summary*

Normal time per place—3.5 min./place.
Normal time per bolt—3.1 min./bolt.
For comparison use 8 bolts/place: 3.1×8+3.5=28.3 min./place.

(4) Total initial cost per section for dust collectors is estimated at $400 per section.

**B. Water Drilling**

(1) Water has been installed at Mine "A" at an estimated cost of $1500 per section.

(2) Water for Mine "B" should cost the same as at Mine "A."

(3) The cost of water installation at Mine "C" is estimated to cost $6250 per section.

This includes cost for supplying each section with self-propelled equipment.

(4) The cost per section is $7800, since this is an initial installation of pipe lines.

*II. Maintenance Costs*

**A. Dust Collectors**

(1) The present dust bags average a life of seven shifts.

(2) Cost of new bags is $6 each. (However, they are now able to have these made locally for about 50 percent of this price.)

(3) Estimated cost of bag replacement per month is $60 per section.

**B. Water**

Since pipe is recoverable, it is estimated that over the life of the mine it will cost $50 per month per section to maintain the pipe lines and/or equipment for transporting the water.

*III. Summary of Costs*

**A. Dust Collectors**

Mines "A," "B," "C" and "D":
Initial cost, $9600.
Maintenance cost per year, $27,000.
Cost/year over 10 yr period, $27,960.

**B. Water**

Mines "A," "B," "C" and "D":
Initial cost, $124,630.
Maintenance cost per year, $15,000.
Cost/year over 10 yr period, $27,463.

The total cost per year without savings being taken into account is $27,643 over a 10-year period for water as compared to $27,960 per year for dust collectors.

## Summary and Conclusions

1. The dust count in the air sampled, where drilling is done wet, is slightly higher than where dust collectors are used, but it is in accord with the recommendations of the U. S. Bureau of Mines.

2. Wet drilling is the simplest, least expensive, and an effective way of suppressing dust. However, it is almost an impossibility to get drillers to use water voluntarily during the "collaring" operations.

3. Drilling speed is slightly faster where drilling is done wet.

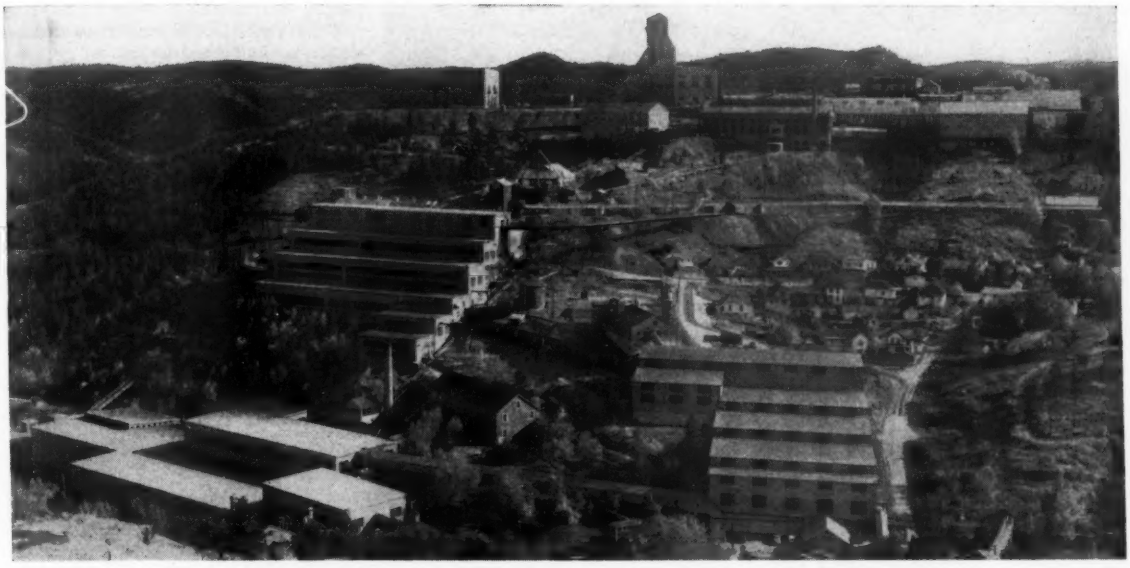
4. Wet, pneumatic percussion roof drilling is a disagreeable job and has an adverse effect upon the mine floor, and possibly to some extent on the impurities in the ¼-in. by 0 coal.

5. Special clothing (coats, pants and boots) is required for the operators of drills where water is used.

6. Although the over-all cost is slightly higher, a dust collector is so compact that one man alone can move it about and set it up with ease and it

*(Continued on page 134)*

# Safety Program At Homestake



Homestake has become an integrated industrial organization covering many fields

## Leading Gold Producer Has Found That Eternal Vigilance by the Entire Organization Is a Prime Requisite for Safe Operations

By GUY N. BJORGE

General Manager
Homestake Mining Co.

EVIDENCE of the need for safety in mining in the South Dakota Black Hills extends back to the year 1834, 42 years before the discovery of the Homestake mine. In that year Ezra Kind, besieged by hostile Indians, inscribed this message on a piece of sandstone:

> "Came to these Hills in 1833, seven of us—DeLacompt, Ezra Kind, G. W. Wood, T. Brown, R.Kent, Wm. King, Indian Crow—all died but me, Ezra Kind. Killed by Ind behind high Hill. Got our gold dust June 1834. Got all the gold we could carry. Our ponies all got by Indians. I have lost my gun and nothing to eat. The Indians hunting me."

Safety came to Black Hills mining too late for Ezra Kind and his party. Though the hazards are different, the need for safety is just as important today as it was then.

It was not until 1876 that evidence of the Homestake lode was found. Two years before that a military expedition, commanded by Gen. George Custer, while exploring the Black Hills region, had found evidence of placer gold in the area. Rumors of this discovery started a gold rush, which became a virtual stampede by 1876. The early operations, centered near Deadwood, were placer mining. One claim in a gulch north of the Homestake outcrop is said to have yielded $100,000 during the season of 1876.

Some of the more experienced miners quickly became interested in the source of the placer gold, and on April 9, 1876, after a winter of prospecting, the Homestake lode was located by Moses and Fred Manuel. They built an arastra in Whitewood Gulch, hauled ore to it by ox-team, and are reported to have recovered $5,000 in the year following their discovery.

In June of the following year L. D. Kellogg investigated the discovery for a San Francisco mining syndicate. He immediately optioned the Homestake and Golden Star claims, comprising about ten acres, for $70,000, purchased others and began development. The Homestake Mining Co. was incorporated in California November 5, 1877. Such was the beginning of one of the great gold mining enterprises of the world. It now includes approximately 6000 acres of mining claims, together with an integration of various supporting operations.

### Mining Methods

Throughout the major part of the mine's life, ore has been extracted in alternate 60-ft shrinkage stopes and 40-ft pillars. Shrinkage stopes are as much as 60 by 300 ft in horizontal section, and 150 ft in vertical extent. When drawn empty the stopes are filled with mill tailings, and the intervening pillar sections are mined in successive panels, using square set timber for support. As each unit is finished, it is in turn filled with mill tailings to prevent damage to surface and underground installations. Some years ago methods were changed to eliminate crown or level pillars. At the present time there is a trend toward a modified cut and fill method with elimination of pillars.

### Supplementary Operations

To support the primary mining operation, large service organizations are necessary. Homestake has thus become an integrated industrial organization covering many fields.

Power for the operation comes from three company-owned hydroelectric stations with installed capacity of 8500 kw and a coal-fired steam turbine plant with installed capacity of 12,000 kw.

The company owns and operates an

Based on paper given at annual conference of Lake Superior Mines Safety Council.

open pit coal mine in Wyoming to supply coal for its own steam plant and for commercial sales. Modern earth moving and excavating machinery exploit a great seam of subbituminous coal which is as much as 90 ft thick.

To supply timber and lumber for mining and construction, the company maintains its own lumbering and sawmill operation, producing about 16,000,000 fbm per year. One hundred and eighty-five men are employed in this operation. Logging operations are conducted in accordance with modern forestry practice, and logs are processed into mine timber and lumber in a modern electric driven sawmill plant at Spearfish, S. D.

A large mechanical department is necessary to service the many operations of the company and includes pattern shop, foundry, machine shop, blacksmith shop and automotive repair shop. Some 240 men are employed.

**Men are trained to recognize, respect and cope with inherent hazards of their work**

Electricity is a major driving force throughout the operation for power, communication, signaling and automatic controls. Consequently, over 50 men are employed in operating and servicing the many electrical installations.

Over the years, plant additions, changes and maintenance have required large general construction projects which have practically all been done with company crews.

These many and complex operations, some of which by nature have inherent hazards, have required the development of sound safety procedures at Homestake. Back in 1834 Ezra Kind may have needed a unit of United States Cavalry for his safety, but most needs today can be met by good planning and common sense.

## The Safety Program

Homestake initiated active safety work many years ago. A safety department was established in 1916 with the appointment of a full-time safety engineer. Mine rescue and first aid training began in 1911 and have been continuously carried on in well equipped quarters with a full-time instructor who also services all of the equipment.

Great progress in accident prevention has been made. For the ten years prior to World War II the severity record for all Homestake operations was 5.02 as compared to an average of 9.60 for all non-ferrous underground metal mines in the United States. We are not quite as happy about our post-war record. For the six years 1946-1951 the severity record has slipped to 6.56. Along with other gold mines, Homestake was closed during the war by an ill-advised order of the War Production Board. Our force of very stable and excellent men were, therefore, forced to leave for nearly three years. Many did not return. In building a new force, safety problems increased with the employment of many wholly inexperienced men and the greatly increased labor turnover. As a result we intensified our safety work early in 1951 and have since greatly improved the accident record.

Our strip coal mine has a severity record of 0.74 for the last 14 years with five no-accident years in that period. Various surface departments have had no-accident years. Our mechanical department, with an average of 250 men, is now in its fifteenth no-accident month.

The safety and accident prevention program may be conveniently divided into four sections. These are: 1) Mechanical improvements and protective guards; 2) safety training for all personnel; 3) maintenance and analysis of accurate accident statistics; and 4) incentive plans for creating interest.

## Mechanical Improvements and Safety Guards

Mechanical safety improvements include: a) Orderliness and good housekeeping; b) care in the design of original equipment; c) installation of safety barriers to shield all possible mechanical and physical danger points; d) safety clothing and equipment; e) proper location of mechanical equipment, both stationary and mobile; f) the development of special safety devices.

Homestake has always regarded orderliness and good housekeeping as a primary requisite for safety and efficiency both underground and on surface with the highest possible standards required. Underground openings, including shaft stations, drifts, haulageways and all workings, are continually cleared of spillage and the accumulation of extraneous material. Old timber, pipe, rails, and other material are not allowed to accumulate in underground openings, active or inactive. New materials and supplies are neatly piled in such a manner that they will not topple over. Shaft compartments are completely enclosed with full gates and barriers at all stations. Haulageways and other workings are inspected regularly for loose ground, which is barred down.

## Ventilation Important

Modern mine ventilation plays an important part in the health and welfare of the underground employes. Exhaust fans displace more than 700,000 cu ft of mine air every minute with fresh air pulled into the mine workings through the main operating shafts. Secondary blowers and auxiliary fans are used underground to boost the flow of fresh air to the working faces and to minimize the dust generated by the mining operations. Automatic ventilation doors control main air currents in the haulageways. Water sprays keep down dust in the working places and at the car dumps over the ore pockets. In the stopes, freshly broken ore is water sprayed at the beginning of each shift.

Adequate safety barriers protect open mine workings, shafts, winzes, and other points of danger. Moving parts of ventilating equipment, pumps, motors and other equipment are carefully housed to minimize the possibility of a workman catching his

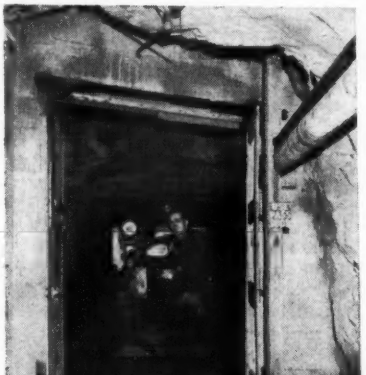
clothing in them. Motors are always grounded to eliminate danger from electric shock. Sollars are placed in manways at frequent intervals so that if a man falls from a ladder he will only drop a short distance. Ore passes and grizzlies are covered or fenced. Unsafe workings are posted with warning signs.

On surface, all shop buildings have painted walkways for the free passage of workmen and supervisors and no foreign material is allowed to accumulate inside these safety zones. Hoist and compressor plant floors are painted, walkways are marked and all moving machinery is fenced off. In all plant buildings it is our opinion that clean and attractive conditions with building and machinery painted and surrounding areas landscaped create pride in their place of work with the men and thus improve both safety and efficiency.

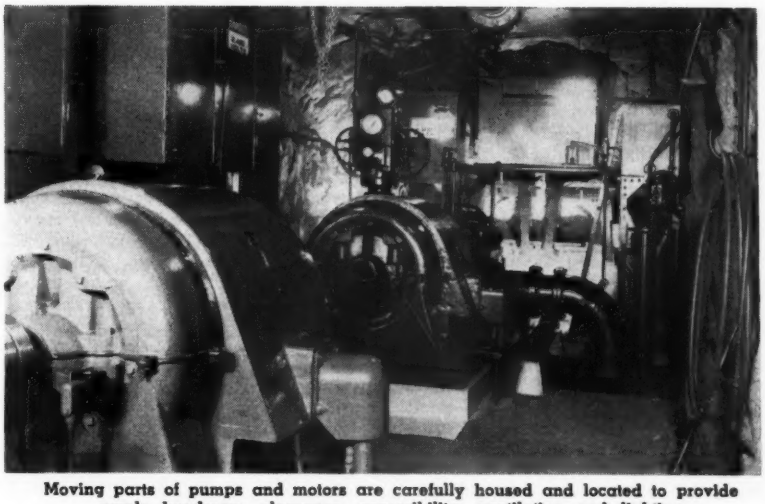
## New Equipment Studied

New pieces of equipment are always studied for possible accident hazards and every possible effort is made to eliminate protruding screws and parts and to box in pulleys and belts on moving equipment. All mechanical equipment is carefully located from the standpoint of headroom, clearance, general accessibility, ventilation and lighting. If stationary equipment is placed so that there is undue hazard in servicing it properly, then an unnecessary exposure to accident is created. Unsafe conditions may arise also through improper lighting or inadequate ventilation, or both. Cars, motors, slusher hoists, air shovels, and other mobile equipment must be carefully checked for track and roadway clearance and headroom.

An outstanding example of a highly successful safety device developed by the Homestake staff is the carrier-current shaft signaling system, the details of which have been described on several occasions in the technical press. By means of it the cage rider may communicate at will by voice with the hoistman whether the cage is stationary or in motion. He is able to change a level designation or give other orders while the cage is in motion, which is a time saver in a deep shaft. An auxiliary electronic device warns the hoistman by means of a red light if the cage chairs are out. When the cager orders "off chairs," the light flashes green the instant the hoistman moves the cage. When shaft repairs are being made, a mobile set of carrier current voice equipment permits the control of the suspended working deck by the shaft man, thus facilitating the work and minimizing the danger of wrong signals.



**Automatic ventilation doors control main air currents in haulage ways**



**Moving parts of pumps and motors are carefully housed and located to provide ample headroom, clearance, accessibility, ventilation and lighting**

The use of safety clothing and equipment is a *must* and includes hard-toed shoes, goggles, safety hats, respirators and electric cap lamps. There have been many instances where a life has been saved by the use of a hard-boiled hat and where an eye has been saved through the protection afforded by approved safety goggles.

It has been our considered policy to provide the safest working conditions and to guard as well as possible all moving parts of machinery and hazardous openings of all kinds. But this is not enough. There is no way in which a buzzsaw can be guarded so as to be absolutely safe. The man who works with that saw must know how to work with it and must treat it with the respect that its inherent hazards merit. We thus come to the second section of the safety program, the safety training of personnel.

## Safety Training for Men

Safety training is provided by the safety department and in meetings of the general safety committee, supervisors and the workmen's safety committee.

The training of personnel begins with the hiring of a new man. The high points of the company's safety policy are outlined for him at his first interview in the employment office. When he reports to the department in which he is to be employed for job assignment, he is briefed in greater detail on the importance of safety and is handed a copy of the official book on "Safety Rules and Regulations for the Prevention of Accidents." He is instructed to read the book carefully and acknowledge it by written receipt within 30 days. The basic objectives are summed up in the foreword, as follows:

> "The rules contained in this booklet have been prepared by the Homestate Mining Co. in the interests of SAFETY and are for the guidance of all employes. It is to the interest of all employes and the company that every job be performed in a safe and efficient manner. Wholehearted compliance with these rules will be appreciated.
>
> "The most important item of each employe's work is the protection of himself and his fellow employes from needless injury. He should at all times consider himself a safety inspector and should report immediately to his boss any dangerous places or practices which come to his attention. A careful workman is generally a good workman. An efficient workman is generally a safe workman.
>
> "Observance of these rules will help prevent accidental injuries and the needless suffering oftentimes resulting to employes, their families and dependents.
>
> "The Homestake Mining Co. has in the past, and will in the future, do everything in its power to prevent accidents and injuries to employes. The company makes every effort to maintain safe working conditions, and will appreciate any suggestions from its employes for the betterment of safety practices.
>
> "No claim is made that every possible contingency has been covered by these rules, and therefore revisions will be made if and when deemed necessary. Employes will be opportunely advised in writing or through the bulletin boards of any such changes. In the meantime, they should ask their boss in case of doubt, and *think*. Safety spells cooperation be-

tween officials, bosses and men. The benefits of its success are immeasureable."

The inexperienced workman's first underground job is usually track cleaning but if he is in a more exposed working place he is always put under an experienced miner. The safety engineer gives safety instruction to the new man in his working place as soon as possible after he is employed. As rapidly as he becomes accustomed to his new surroundings and the work program, he is given added opportunities to prove his further capabilities.

Both mine and surface personnel are trained in the elements of first aid by fully accredited instructors. Moreover, a large number of the underground employes are trained in mine rescue work. Upon satisfactory completion of these courses, the employe is awarded an official U. S. Bureau of Mines certificate. First aid and mine rescue training have long been recognized as basic functions of well integrated mine safety programs and the record of their accomplishments speaks for itself.

First aid kits are located at convenient points throughout the operations. Emergency stretcher equipment and jacks are available on active levels.

The handling of explosives begins with its receipt from the manufacturers at the main surface magazines located several miles from the mine. Dynamite is transported by rail as needed to the mine where experienced personnel lower it underground for delivery to a main upper level storage magazine, far from active mine operations. The capacity of the magazine is purposely limited as a safeguard. From it, daily requirements are met by redistribution of smaller quantities of explosives to secondary small magazines located at convenient points near active workings. Not more than three days' supply is stocked on a working level. The magazines are small chambers excavated in solid rock. Floors and shelving are of wood, doors are steel grills, electric wiring is in conduit and light bulbs are housed in tight protective glass globes. Explosives are delivered to the miners in canvas bags by powdermen.

All detonators are made up at the fuse house on surface. Caps are crimped by an electrically actuated crimper and then delivered underground in special "cap cars" handled by the powdermen. Underground magazines for the caps and fuse are entirely separate from but near the dynamite magazines.

## Close Cooperation Stressed

The safety department comprises a safety engineer and an assistant. The former inspects all company operations and those of its subsidiaries, the Golden Gate Timber Co. and Wyodak Coal Co. In addition he assembles records, prepares reports and periodically meets with all safety committees. He keeps in close touch with the supervisory force and the working personnel, spending a considerable part of his time underground with the men in the workings. The assistant confines himself primarily to the inspection of underground operations and to first aid and mine rescue training. First aid training is given as many men as possible and mine rescue work to a more selected group. The first aid and mine rescue station is equipped with 12 McCaa breathing apparatus, 24 all service masks, 1 M.S.A. oxygen pump, 2 carbon monoxide detectors, 1 hydrogen sulphide gas detector, 2 safety lamps and a large supply of carboxide, goggles, respirators, and miscellaneous first aid material.

## Committee Work Valuable

There are two principal safety committees, the Central and the Workmen's. The Central Committee meets monthly and membership includes the management, the chief surgeon, the heads of the various departments and the safety engineer.

**Ore passes and grizzlies are covered or fenced**

The Workmen's Committee consists of day's pay employes appointed by the department heads, five members being from the surface departments and three from the mine. Meetings are held bi-monthly. Periodic inspection trips are made both underground and on surface, usually three or four days prior to the meeting of the Central Committee. Their recommendations are prepared in a meeting without presence of any supervisor and submitted to the Central Committee in writing. These are promptly investigated, discussed and the recommendation carried out in practically every case.

Of equal importance is the special Mine Supervisory Safety Committee which meets monthly, directly following the meeting of the Central Committee. Those participating include management, the mine superintendent and his assistant, the safety engineer and all mine foremen. All mine accidents in the previous 30-day period are discussed and analyzed in detail and remedies are sought to minimize or eliminate their recurrence. Foremen are encouraged to talk freely about their problems and much good is accomplished by this free interchange of ideas. Supplementary to this meeting, quarterly gatherings of all mine shift bosses are held with the Mine Supervisory Safety Committee. Typical accidents are analyzed and the safety angle is stressed. Here again, as in all other safety meetings, the important role of the boss in safety is emphasized and he is made to feel that in the eyes of his men he not only represents management but *is* management. In mining operations the success of a safety program lies primarily with the shift boss and his men, and the degree of its accomplishment is largely measured by the extent of their cooperation. All present are urged to participate fully in the discussions. It is felt that these meetings are of great value in the accident prevention program.

A safety bulletin service is maintained throughout the operations, most of the bulletins being furnished by the National Safety Council. Special company bulletins are also displayed. A giant clock shows when the last accident took place and the number of days elapsed since its occurrence. In addition to the bulletin service, a number of various safety and accident warning signs are prepared for both underground and surface use.

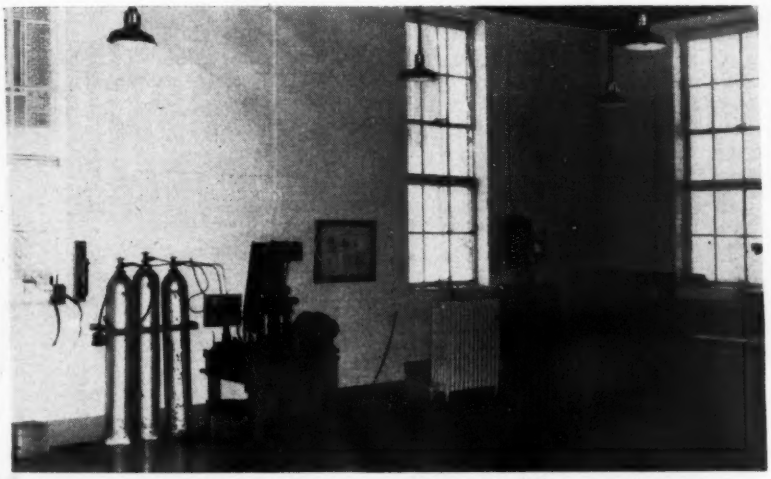
A monthly four page employe paper, "Sharp Bits," is mailed to all em-

ployes and, in addition to newsworthy items of general employer-employe interest, regularly carries safety items and instruction.

For interchange of ideas and experience, the company regularly sends representatives to the meetings of the National Safety Council, the Lake Superior Mines Safety Council meeting and the safety and operating sessions of the American Institute of Mining and Metallurgical Engineers and the American Mining Congress.

## Analyze Vital Statistics

Statistical data of both lost-time and near accidents give an accurate picture of the relative risk in different classes of work and may lead to a logical remedy. An individual case history of an employe may reveal proneness to accident, whereby re-examination and analysis will permit of corrective measures. Specific safety rules to be of value must not only be learned but must be coordinated with the work program. Monthly reports on "Parts of Body Injured" and "How Injured" are made. Graphs of frequency and severity rates sharpen the minds of management and the supervisory forces on the accident trend. Such statistics must be accurate. Unless they are carefully studied and used for future accident prevention they are of no value.



**Miners receive First Aid and Mine Rescue training in this fully equipped instruction room**

## Rewards Create Interest

Various plans have been employed to create and maintain interest in Accident Prevention. It is difficult to evaluate but it is our opinion that any plan which serves to create safety discussion by employes has value. Frequently such an interest creating plan has real value for a time but fails when the novelty wears off and new plans must be developed.

Prior to 1934, every man completing a year without a lost-time accident was given a ten dollar gold piece. For five such years he received a twenty dollar gold piece. Its most important effect resulted from the fact that many men carried these as pocket pieces, displayed them with pride as evidence of their safety record. When it became a crime to distribute or own a gold piece, the plan lost its value, for when the same amount was received by check, it was spent and that ended its value.

Since 1940, watch fobs have been given for individual safety records. Distinctive fobs are provided for surface and underground work. Upon completion of five, ten and fifteen year periods of underground work without lost time accident, bronze, silver and gold fobs, respectively, were presented. For surface work the periods for similar awards were ten, twenty and thirty years.

For some years an annual lottery drawing with a few large prizes was tried. Tickets were awarded under fixed regulations. First prize was as much as an automobile. This was effective for a time but was later discontinued.

In April, 1951, a new plan was instituted for all departments. In the mine, a drawing is held monthly and each underground employe who has had no accident in the period just ended is eligible to have his name included in the drawing. Prizes vary in number each month, according to their value. One month there may be ten prizes and the next one hundred of lower value. Examples of prizes are turkeys, hams, flash lights, pen and pencil sets, baskets of groceries, and first aid kits. An employe completing an accident free year is eligible to draw for one of the capital prizes; such as, a table radio, a coffee maker, waffle iron, a basket of groceries, or a roast of beef. Similar drawings are held for surface employes for periods of three months.

## Recreational and Health Program

Good recreational and health facilities go hand in hand with employe well-being and contentment and without these an employe cannot do his best work. Homestake has been ever mindful of the welfare of its employes and the communities in which its operations are conducted. It encourages and supports civic enterprises of constructive value in community life. A number of years ago it levelled the top of a hill for a school athletic field and subsequently in 1948 the field was turfed and equipped with concealed sprinklers and a cinder running track. During the school year the field is used by the local High School and in the summer months for Company sponsored athletic and civic events, especially baseball.

The Company's Homestake Club facilities, originally opened in 1914, are available to the entire community. It is a modern recreational plant which includes six modern bowling alleys, a swimming pool, showers, billiard and pool tables, a card room, lounge, radio, a community center room for meetings of civic groups and a fine public library. A trained full-time director supervises the club and outside activities; such as, baseball, softball, and basketball. The Homestake Band gives weekly community concerts throughout the summer season and in addition plays at several regional gatherings.

## Provide Hospital Care

Of basic and primary importance is the Homestake Medical Department. Founded in 1879, very shortly after the birth of the Homestake Enterprise, it has continued to grow and maintain top rank in the quality of its service. The modern hospital plant is equipped with up-to-date surgical and medical facilities. Homestake pioneered in the furnishing, absolutely free to its employes and their immediate dependents, complete medical, surgical and obstetrical treatment. No charge is made for hospital care, operating fees or X-Rays. A competent and well-trained full-time staff of physicians and nurses is employed.

Modern change rooms are located wherever required throughout the operation. Underground employes going off shift are unloaded at a steam heated ramp level which leads directly to their change house, where locker rooms and hot showers are provided.

The Homestake Employes' Aid Fund, a group insurance plan providing sick and death benefits was organized in 1910 and has since continued successfully. Pensions for employes of long service were initiated in 1917. That plan was very informal. In 1949 it was replaced by a formal trusteed non-contributory plan to in-

*(Continued on page 140)*

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The conventional room and pillar system is not suitable for continuous mining

# Mine Projections For Continuous Mining

M. H. FORESTER (Chairman), W. E. HESS, W. J. PHILLIPS, J. J. SNURE, R. D. SNOUFFER, C. W. THOMPSON, R. C. VANCE

**A Report of the Subcommittee on Continuous Mining Projections Submitting Four Plans Which Have Found Practical Application for Different Types of Machines.**

IN AUGUST, 1949, a subcommittee was appointed to undertake a study of plans and projections for working entries, rooms and pillars with continuous type mining machines. Methods of power distribution and the major auxiliary operations were to be included. Although it may seem that considerable time has been required to prepare the study presented here, it should be kept in mind that in 1949 "continuous mining" was in the early experimental stage and plans for operating these new machines had not been designed or evolved. As an initial step in endeavoring to fulfill its function, the committee first gave consideration to the basic principles involved in the preparation of plans or projections for the development and exhaustion of a given area of coal with the employment of such machines.

A mine projection must take into account the factors of roof control, drainage, ventilation, transportation, material supply and power, all of which are affected by the concentration of productive effort and operations in one place. In order to capitalize on the potential capacity of continuous mining to the maximum degree, it is obvious that all ends—managerial, mechanical and otherwise—must point toward continuity of operation of the machine itself. Certain machines will be more adaptable to specific seam conditions than will others, hence the type of projection will be limited by the operating features of the mine machine selected.

## Many Factors to Consider

Various economic and physical factors dictate the mining system to be employed. Coal of metallurgical quality will usually be mined with some method of pillar recovery, while steam coals are often mined without attempting the fuller extraction. A continuous mining projection must, in either case, accommodate maximum recovery with the system selected. The width of working place is of minor consideration from a production standpoint, but of primary importance from the standpoint of roof control, ventilation, maneuverability of equipment and material supply. The length and angles of entries, crosscuts and rooms are dependent on the flexibility of the machine, on transportation facilities and power supply. Effects of seam and roof cleavage may occasionally exert some influence on directional control.

Concentration of production into a few machines amplifies the effect of unit outages. Clay veins, bad roof, wants, etc., might critically affect total mine production. The operation of one unit should not be dependent upon another. To avoid concentration of dust, each unit should operate in its own split of air, unless sufficient

distance between units can be allowed for dust settling.

While new designs and improved models of continuous type machines are being developed, the successful combination of the separate cutting, drilling, blasting and loading operations of a conventional mining cycle into one operation can be considered an accomplished fact. There are approximately 175 such machines now in underground service, with the prospect of increasing this number to 225 by January 1, 1953.

## Not Yet Continuous

There is as yet no continuity in face operation, and a large majority of the installations are still experimental. A more practical solution to the roof control and transportation problems than is yet available must be found before any radical departure from past concepts of mine projection can be attempted. These two supporting functions govern the element of time-advance under "continuity of operation."

The committee has studied numerous methods, plans and projections where continuous type machines are employed on entry development, solid mining in rooms and on pillar extraction. The projections used for experimental operations quite generally conform to those of conventional mechanical mining. Some modifications are beginning to appear as engineering groups study machine performance under the varying physical conditions of seam and roof. The committee submits herewith, as a part of its study, some projections which have actually been tried and found advantageous underground.

In presenting the projections and accounts of the machine operations it should be explained that in accordance with an established policy of the Coal Division, the names of the mining and manufacturing companies are not given. This policy was adopted some years ago in order to avoid, in publishing a committee report, any appearance of recommending or criticizing an individual type of equipment. In the following reports, therefore, the word "continuous" is used to designate all types of machines, as manufactured by different companies, that cut and load coal from a solid face in one operation without drilling and blasting.

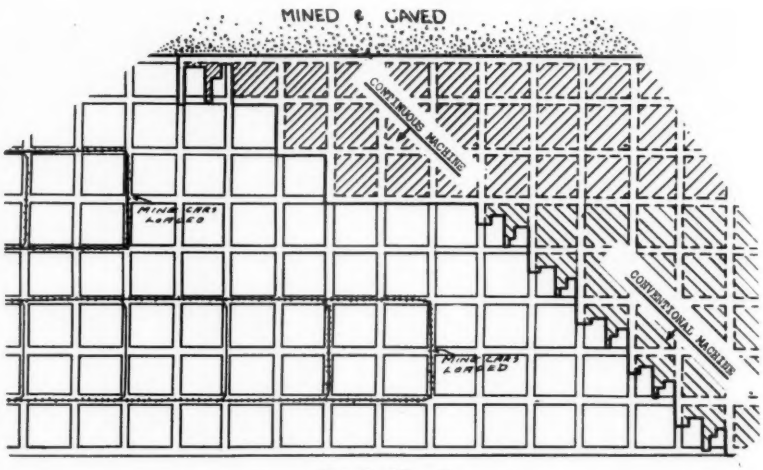


Fig. 2—Mine B

## Report on Mine A

Figure 1 shows the plan for the entry development and also for the proposed pillar recovery. All entries and breakthroughs are 16 ft wide and on 70-ft centers. To explain the plan of entry driving, consider that a development cycle is beginning when the headings are as shown by the heavy solid lines. The subsequent advance is shown by the dotted lines with the sequence of mining indicated by "first," second," etc.

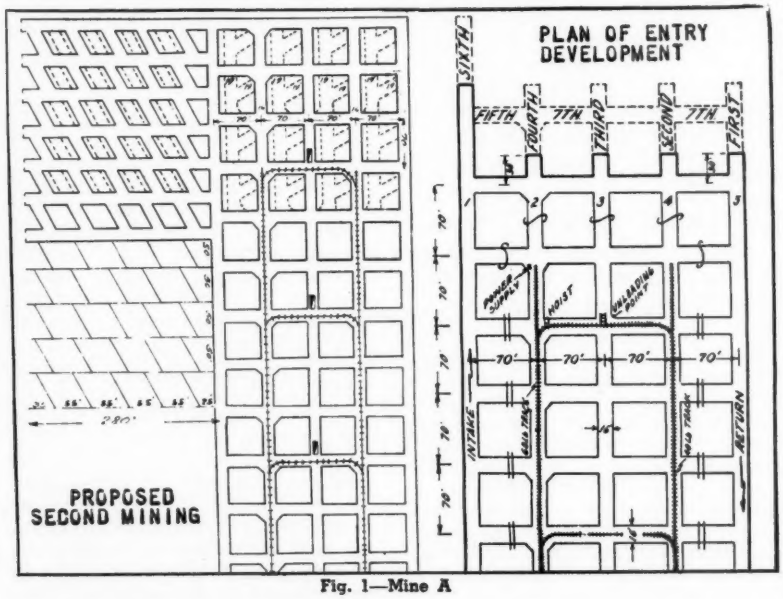


Fig. 1—Mine A

The first place mined in the cycle is No. 5 heading. This is driven in successive 8-ft lifts until the face of the entry, 16 ft wide, is the required distance ahead of the open crosscut. The machine then moves out and drives No. 4 and No. 3 entries in the same manner and for the same distance. In advancing No. 2 (marked "fourth") the entry widens out at the point where the next crosscut is to come through, and then No. 2 advances the same distance as in the case of entries 3, 4 and 5. After finishing the required advance in No. 2, the machine is backed out and mines the crosscut through into No. 1 (marked "fifth"), and then drives No. 1 70 ft (marked "sixth") to put it ahead of the next crosscut. After advancing No. 1, the machine backs out and trams through the newly driven crosscut to No. 2 heading where it starts the crosscut (marked "seventh") that is driven across the entries through to No. 5. When this crosscut holes into No. 5, the cycle is completed and the next cycle is ready to start as described above.

This system has several advantages. First, the machine is kept advancing a maximum of the operating time. Second, as the power source is on No. 2 heading, this system eliminates wrapping the cables around any block of coal as would be the case if the crosscuts were driven through from No. 1 to No. 5. Third, by having all places 30 ft past the crosscut center line at the start of an advance cycle, two shuttle haulage roads can be maintained to any face. Fourth, only one turn is needed. To simplify this turn, No. 2 entry is widened out on both sides at the point of intersection and when the machine drives across

No. 5 the other crosscut intersections are normal width.

The seam has a height of about six ft, overlain by a dense hard lenticular shale. The bottom is a hard slate over a few inches of coal and fireclay. Service haulage is by shuttle car discharging into mine cars as shown on the sketch. The loaded track is laid with 60-lb rail, the empty track with 40-lb. A trip of mine cars is placed at the loading point and moved with a rope hoist. Ventilation is shown on the sketch. Permanent stoppings are used along the main intake and return with curtains in the working section.

## Report on Mine B

This report describes a retreating pillar operation, working the block system with conventional loaders and continuous machines. A panel is developed to the inby barrier by driving a set of eight rooms on 100-ft centers with crosscuts every 100 ft. All places are 15 ft wide so that the first mining cuts the panel into blocks approximately 85 ft square. Rooms are driven with a conventional mechanical loader and the development operation is not considered in this report.

As shown in Figure 2, the retreating panel is eight blocks wide. On the right hand side five blocks are extracted with a conventional mechanical loader while the three blocks on the left are recovered by continuous mining. In both instances shuttle cars are used for service haulage, discharging into 10-ton mine cars. Each system has its separate rail haulage and mine car loading points.

The method of pillar recovery is approximately the same with each type of machine—first, splitting the pillar and then pulling the wings back by open-end cuts. Principal difference between the two operations is that the conventional unit has five blocks being extracted simultaneously while the continuous machine is confined to one block at a time. Continuous mining has retreated more rapidly than the conventional operation so it will be necessary to give an added block to the continuous unit in order to keep a 45° pillar line across the panel.

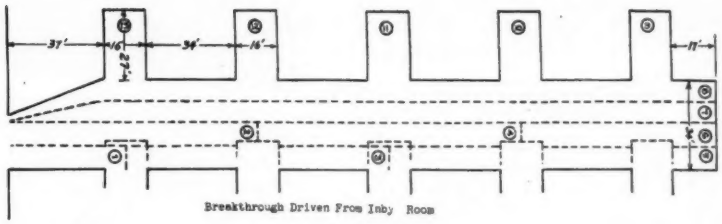


Fig. 3—Mine C

The seam has a height of approximately 7½ ft with 10 to 12 in. draw-slate overlain by 4-12 in. coal and 15-20 ft of hard slate. The bottom is clay with numerous rolls. The conventional unit has a total crew of 17 men, including the loaders, cutters, shuttle operators, drillers, shotfirer, timbermen, etc., who produce an average of 340 tons per shift or 20 tons per man. The continuous unit has a total crew of six men, including shuttle car operators and timbermen, who produce an average of 210 tons per shift or 35 tons per man.

## Report on Mine C

In this operation, rooms are driven by continuous mining but the pillars are not recovered. Rooms 325 ft deep are 34 ft wide on 50-ft centers; this leaves a 17-ft pillar, but the pillar is partially mined by breakthroughs so that the theoretical extraction is nearly 80 percent. The continuous machine makes a cut nine ft wide, which means that a 34-ft room is driven in four lifts. The sequence of driving is shown in Figure 3.

The room is first advanced by alternate cuts, nine ft wide, to make an 18-ft width to the depth of 325 ft (Nos. 1, 2, 3, 4, 5, 6). This gives sufficient room for the shuttle car haulage. Ventilation is established as the room advances by cutting into the breakthroughs that were previously driven through the pillar from the outby room. Upon completion of the 18-ft width, the machine is moved back to the entry and a third cut eight ft wide is taken the entire room length (No. 7) followed with a fourth cut for the full room length (No. 8). This completes a 35-ft width leaving a 16-ft pillar next to the adjacent room. The machine is then turned at right angles and drives breakthroughs 16 ft wide on 50-ft centers through the inby rib for a distance of 27 ft to cross the line of the next room ahead (Nos. 9, 10, 11, 12, 13).

Haulage is with two shuttle cars. One travels the room being driven and the other travels the adjacent room, coming to the machine through the breakthroughs. This prevents tangling the trailing cables.

In beginning a panel the first step is to drive a pair of line rooms just inside the barrier pillar for panel ventilation. These rooms are 18 ft wide on 50-ft centers. The second step is to drive the next two rooms with no crosscuts to the line rooms except at the top of the panel. Air is regulated in this last breakthrough. After the ventilating circuit has been established, the second pair of rooms is widened to the full 34 ft. Mining the panel then proceeds as described, by driving one room at a time and using the adjacent completed room for ventilation and haulage.

The seam is 38 to 41 in. thick with a hard slate top and hard fireclay bottom. Cover is from 200 to 300 ft.

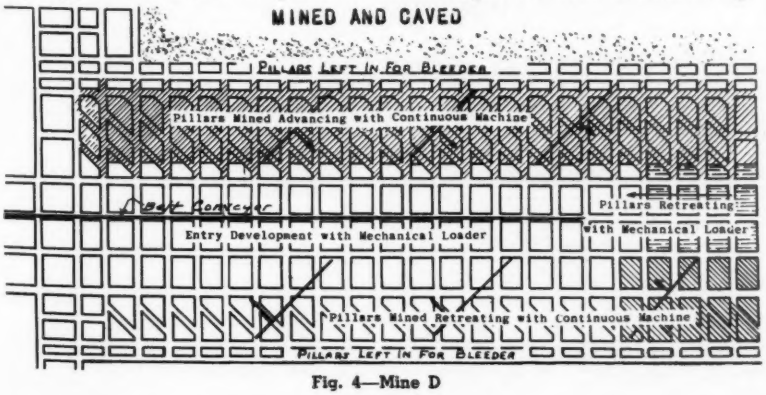
MINED AND CAVED
Pillars Left In For Bleeder
Pillars Mined Advancing with Continuous Machine
Pillars Retreating with Mechanical Loader
Entry Development with Mechanical Loader
Pillars Mined Retreating with Continuous Machine
Pillars Left In For Bleeder

Fig. 4—Mine D

## Report on Mine D

This report describes a mining plan that combines a conventional mechanical loader and a continuous machine for panel entry development and complete pillar extraction. Pillars are mined both advancing and retreating. As shown in Figure 4, development consists of four entries driven by a mechanical loader to the panel limit. While these are driving, a continuous machine mines pillars advancing, extracting a block on the left side of the entries 200 ft wide and up to the line of the previous panel which has been mined and caved. When the developing entries have been driven to the panel limit, the mechanical loader starts pillars retreating, mining out two sets of entry blocks. At the same time an area approximately 200 ft wide on the right is pillared retreating.

Service haulage is by shuttle cars delivering to an entry belt in the third entry. This belt discharges to mine cars on the main haulage road. A "bleeder" entry to ventilate the pillared area is left on both the inby and the outby boundaries of the panel.

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because two high torque air motors function together on the powerful crowding action—and the Gardner-Denver moving fulcrum provides extra force for digging into stubborn muck piles.

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Extra speed developed by the moving fulcrum as the dipper nears discharge position throws the ore far back to completely fill your big capacity mine cars.

**FULL *time availability . . .***

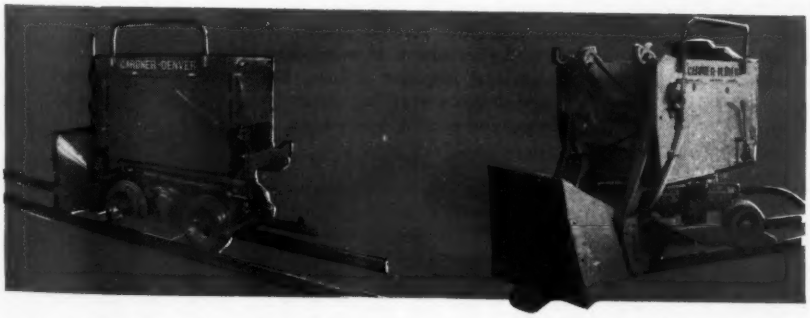
Heavy-duty construction, fewer moving parts and protected lubrication keep Gardner-Denver Mine Car Loaders underground—enable you to plan on using your Gardner-Denver Loader 'round the clock, at several different faces.

**FULL *measure of safety . . .***

Low center of gravity, clean exterior design, simple and convenient controls and other safety features protect your miners against injury.

Send today for Bulletin MCL.

Gardner-Denver Loader quickly cleans up a round of coarse, abrasive muck.



The smaller GD9 Mine Car Loader—for fast loading in low or narrow headings.

The GD14 "Big Bite" Loader—for high tonnage loading into big mine cars.

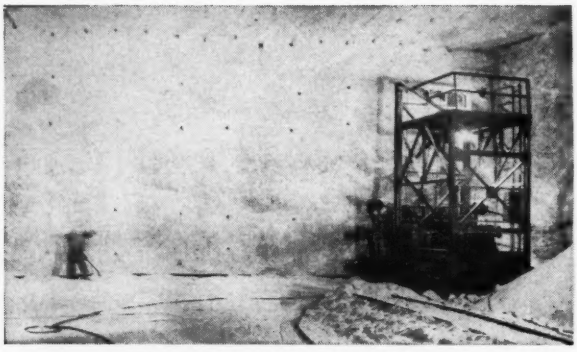
SINCE 1859 **GARDNER-DENVER**

Gardner-Denver Company, Quincy, Illinois
In Canada: Gardner-Denver Company (Canada), Ltd., Toronto, Ontario

THE QUALITY LEADER IN COMPRESSORS, PUMPS AND ROCK DRILLS

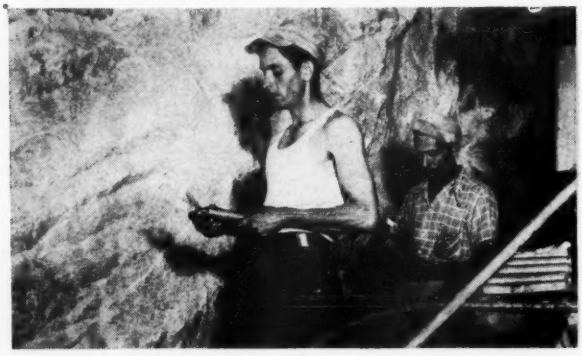
# A Switch to DuPont "MS" Delay Caps

## produces better fragmentation



**When the Avery Island,** Louisiana, Mine of the International Salt Company switched to Du Pont "MS" (Millisecond*) Delay Electric Blasting Caps, (replacing old-style delays), fragmentation was greatly improved, and a much more economical drilling pattern was adopted. Picture above shows face drilled and ready for loading.

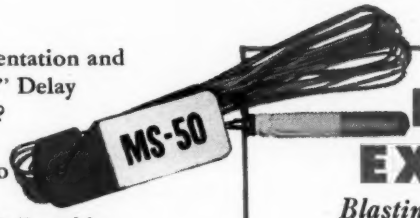
**Loading face** with Du Pont Extra Dynamite. Rooms average 25′ high by 75′ wide. Average round consists of 108 holes drilled to same depth as the undercut, about 11 feet. All loading in this mine is done from the drill jumbo shown in picture at the left. Parallel series hook-up is used in firing the blast.



**Miners making primers** with Du Pont "MS" Delay Caps. In this face they use "MS"-75 to "MS"-300 inclusive. This customer also recently replaced cap and fuse with "MS" Delays in their high roof operations, and obtained exceptionally good fragmentation.

**A typical shot** in this mine with Du Pont "MS" Delay Caps. Customer reports greatly improved fragmentation, practical elimination of secondary blasting, reduced concussion and lowered drilling costs. These millisecond interval delays are giving similar results in many types of underground mining operations.

If you would like to improve fragmentation and cut costs, why not try Du Pont "MS" Delay Electric Blasting Caps in your mine? The Du Pont Explosives representative in your area will be glad to give you complete information on these short-interval delay caps. Call on him soon. E. I. du Pont de Nemours & Co. (Inc.), Explosives Department, Wilmington 98, Delaware.




* *Available in 14 millisecond delay intervals: MS–25, –50, –75, –100, –125, –150, –175, –200, –250, –300, –350, –400, –450, –500.*

**Visit Du Pont** *in Booth 825 at the 1952 Mining Show of the American Mining Congress, September 22-25—Denver, Colorado.*

**DU PONT EXPLOSIVES**

*Blasting Supplies and Accessories*

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*150th Anniversary*

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

## New Machine Bit Developed for Severe Cutting Conditions

A new cutter bit, Style UR, is being manufactured by Kennametal Inc., Latrobe, Pa. Bit is designed for faster cutting where shock conditions are severe, such as in the Continuous Miner, and in seams having large amounts of rock and other hard impurities. Features of the new UR Bit are its hard insert of Kennametal tungsten-carbide, and a special shank design that holds the insert firmly on four surfaces. Performance to date shows reduced cutting costs in rugged, rock-laminated seams.

●

## Hollow Drill Rod For Roof Pinning

Hollow drill steels have been adapted by Kennametal engineers for use in the wet drilling of roof bolt holes. A square hole is formed at the end of the rod to accommodate the Kennametal HFD Bit. The bit has been adapted for wet drilling by grooving two sides of the shank to afford a passage for water. The advantage of water, besides controlling silica dust, is increased bit life.

●

## Coal Company Reduces Bit Cost 50 Percent

Peters Creek Coal Company Superintendent, James Savilla, reports that bit cost over a base period of two months has been reduced approximately 50% by changing from steel to Kennametal. The cost reported was $187 for the use of steel, $92.50 over the same period using Kennametal. Other advantages in speed, and ability to drill rock were cited.

●

## Ivan J. (Dutch) Kinter Joins Kennametal Sales and Service

With the appointment of Ivan J. (Dutch) Kinter, effective July 1, as a Kennametal sales and service representative, Kennametal has representation in all of the major coal and non-metallic mineral producing centers of the United States. Mr. Kinter's territory will include eastern and southern Colorado, New Mexico, and Arizona. His headquarters will be in Carlsbad, N. M.


FAST WAY

to drill ANY roof

Your mine roof, whether medium or hard, can be drilled faster and more easily with one of the types of Kennametal Bits illustrated above.

The RD Bit, with prongs angled for strong digging action, rotary drills boney, shale, and slate. The sturdy HFD Bit is used in the hardest material that can be rotary drilled with a carbide cutting edge, offers added drilling speed because the slotted-blade design eliminates the point of zero velocity. In formations too hard for rotary drilling, the PT Bit, with three Kennametal blades, gives more footage, faster (by about 10%), than any other multiple-point bit, and minimizes the tendency to over-penetrate when entering softer roof.

These bits can do a better job for you because (1) their unique Kennametal cutting edges resist wear and shock better than any other carbide, stay sharp up to 100 times longer than steel and (2) Kennametal tool design—often imitated but never equalled—assures great strength and smoother, safer, trouble-free operation.

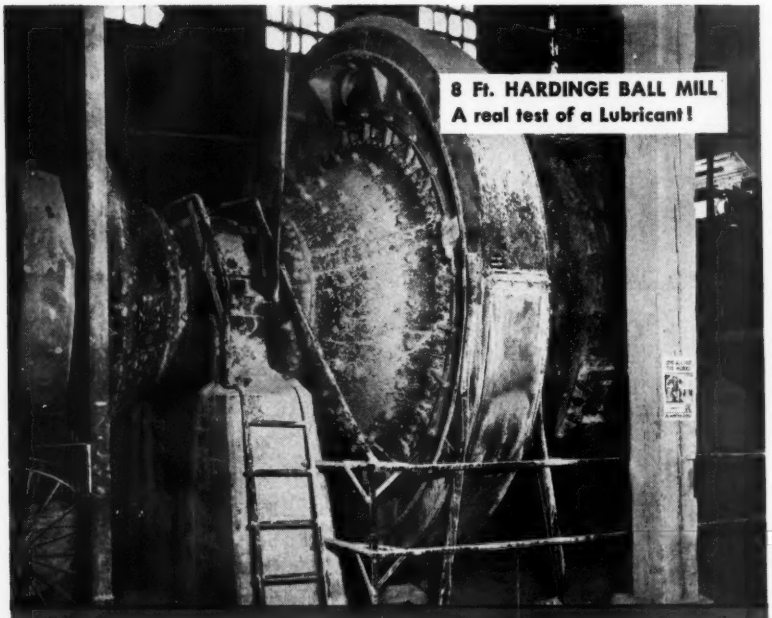
One, or all, of these Kennametal Bits can help you get fast, low-cost roof-drilling. Your Kennametal representative will be glad to go into your mine and demonstrate them for you. Contact him today! Kennametal Inc., Latrobe, Pa.

*Names of Kennametal Representatives appear in the McGraw-Hill Mining Catalogs*

KENNAMETAL ®

DRILL BITS • MACHINE BITS • ROCK BITS • ROOF BITS

*Specialists in Coal Cutting and Coal Drilling with Tungsten-Carbide Tools*




# "LUBRIPLATE No. 630-AA is practically a universal lubricant"

—so writes the SPOKANE PORTLAND CEMENT COMPANY of Irvin, Wash.

"**Lubriplate Lubricants** enabled us to cut the number of lubricants we were using to about half, but even then we were still using five different LUBRIPLATE Products. With the introduction of LUBRIPLATE No. 630-AA, we were able to reduce our requirements still further. Today we are satisfying all our needs for solid type lubricants with only two LUBRIPLATE Products. LUBRIPLATE No. 630-AA might almost be considered a Universal Lubricant. Furthermore, LUBRIPLATE No. 630-AA has effected a marked savings in lubricants and labor."

*Frank D. Neill*
General Superintendent

**SIMPLIFY YOUR LUBRICATION SCHEDULE**

**Lubriplate Lubricants** set new high standards: They reduce friction, wear and power consumption. They prevent rust and corrosion of bearings, parts and product. They last longer than ordinary lubricants. LUBRIPLATE Lubricants are available from the lightest fluids to the heaviest density greases to meet all conditions, usual and unusual. Write for case histories of the use of LUBRIPLATE in your industry.

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Fiske Brothers Refining Company
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***THE MODERN LUBRICANT***

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## *Specify LE-HI for all Hose Couplings!*

Wherever hose is used there is a LE-HI hose coupling to match—from small tubing to large industrial applications.... The complete LE-HI line includes:

- **Air Tool Couplings**
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***Sold through leading distributors and rubber manufacturers only.***

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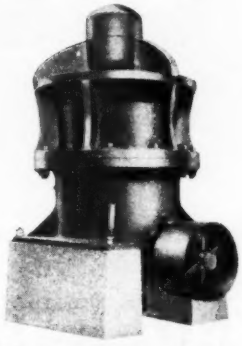
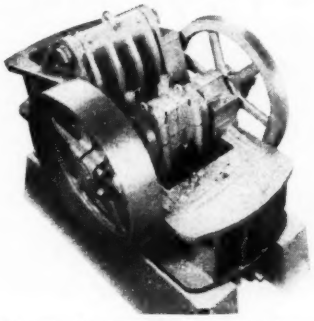
TRADEMARK REGISTERED

# 50 years

## ...makes a BIG DIFFERENCE



The Traylor TY Reduction Crusher is a perfect example of compact, simple design for efficient operation. Ask for Bulletin 6112.



The Traylor Type H Jaw Crusher is just one of 33 sizes available to meet your needs. For specifications and descriptions, ask for Bulletin 4105.

The Traylor TC Gyratory, with its curved concaves and bell head, incorporates proven principles of efficient crusher design. Ask for Bulletin 126.

A comparison of ancient and modern methods of ore reduction is truly amazing . . . especially when we realize how great have been the advances during the past 50 years alone. In that time, Traylor has spearheaded the development of machinery for the mining industry by introducing a wide range of more efficient equipment for crushing ore. As mining methods changed, Traylor took the lead in supplying new and improved equipment to fit each specialized job. When you need crushing equipment, buy the make with a world-wide reputation for efficiency and economy of operation . . . buy Traylor. 50 years experience makes a big difference.

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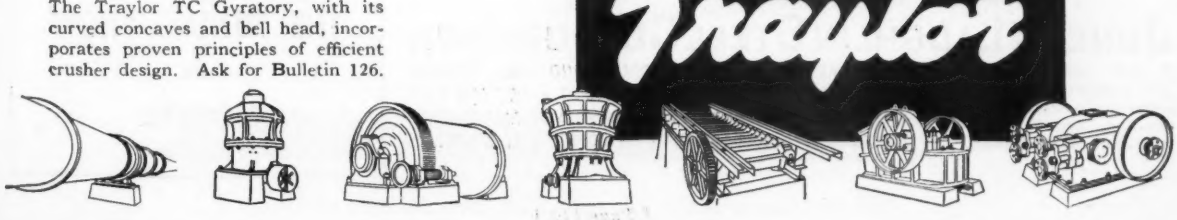
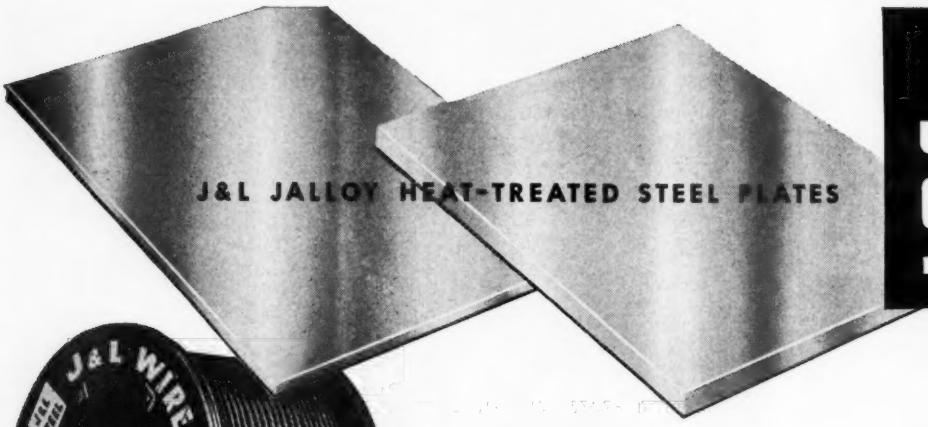
OUR GOLDEN ANNIVERSARY YEAR
1902 — 1952

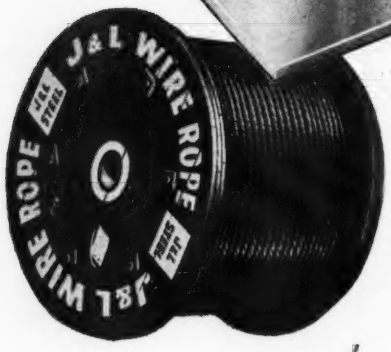
Booth 616

Traylor



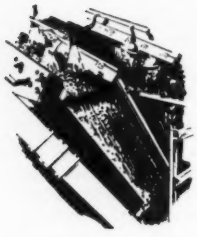



# J&L STEEL




# TWO GREAT J&L PRODUCTS

## *Designed to help you Cut Costs*



**Heat-treated Jalloy plate** is made for use in the mining and quarrying industries where impact and abrasion severely limit the life of ordinary steel. (Jalloy has a yield strength and a Brinell hardness 3 times as great as mild steel.) The result—Heat-treated Jalloy lasts 3-5 times as long as mild steel, yet costs only twice as much.

**J&L Wire Rope** is manufactured in a wide range of sizes and constructions specifically designed to do the job on every type of equipment and under all types of operating conditions. The result—J&L Wire Ropes give maximum service life.

We'll provide you FREE with detailed information on both these great J&L products. Write to Jones & Laughlin Steel Corporation, Gateway Center, Pittsburgh 30, Pa.

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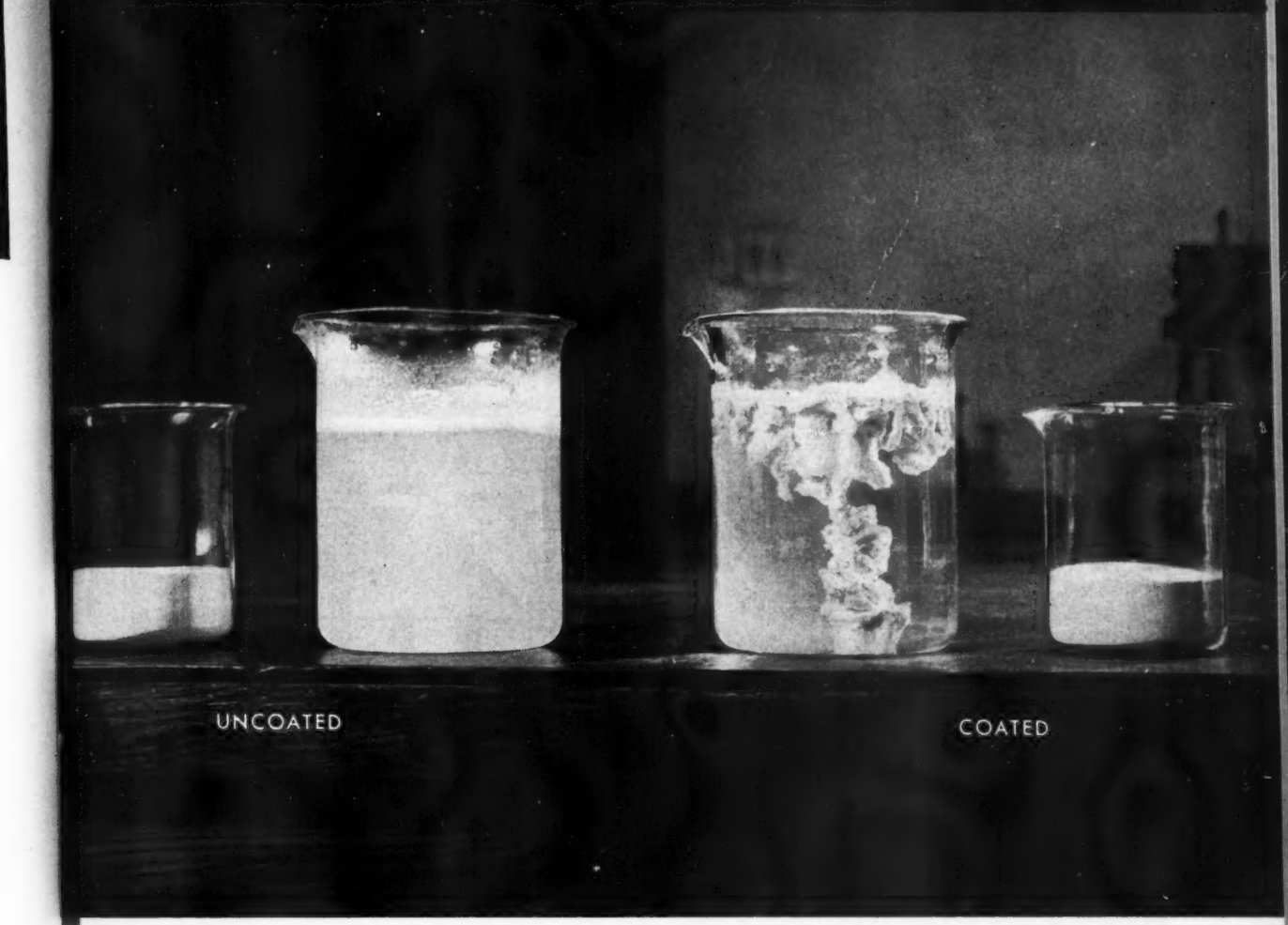
## JONES & LAUGHLIN STEEL CORPORATION

*From its own raw materials,* J&L *manufactures a full line of carbon steel products, as well as certain products in* OTISCOLOY *and* JALLOY *(hi-tensile steels).*

**PRINCIPAL PRODUCTS:** HOT ROLLED AND COLD FINISHED BARS AND SHAPES • STRUCTURAL SHAPES • HOT AND COLD ROLLED STRIP AND SHEETS • TUBULAR, WIRE AND TIN MILL PRODUCTS • "PRECISIONBILT" WIRE ROPE • COAL CHEMICALS

# PROGRESS IN EXPLOSIVES . . .




## WHICH BEAKER HAD THE BANG?

The small beaker (left) contains ammonium nitrate. This is an important explosives ingredient, but it absorbs moisture readily. Notice in the large beaker (left)—how it dissolves immediately in water.

The small beaker (right) contains *Hercules* ammonium nitrate *treated with a special resin*. In the large beaker (right) note how the resin-treated ammonium nitrate repels water without affecting explosives' properties.

Here is a simple example of Hercules' pioneering that gives you better blasting efficiency under adverse storage and climatic conditions both in manufacture and in field use.

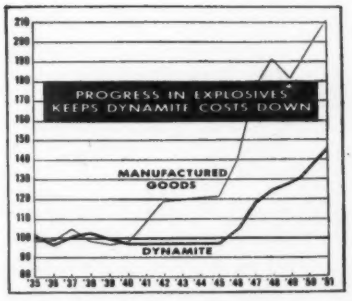



Chart shows relative stability of dynamite prices since 1935, as compared with prices of other manufactured goods. 1935-39 values=100.

HERCULES POWDER COMPANY
INCORPORATED

*Explosives Department, 922 King St., Wilmington 99, Del.*

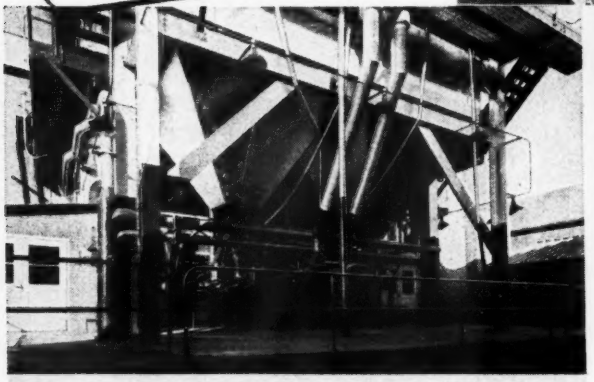
XR52-4

# "We modernized our plant, installed new COAL-burning equipment, AND CUT OUR FUEL COSTS 45%!"

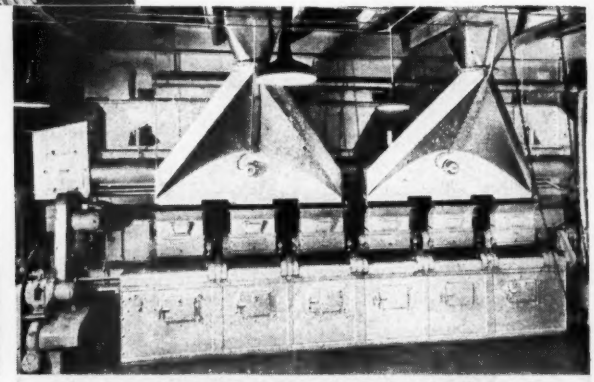
"In Addition, Automatic Coal- and Ash-Handling Equipment Cuts Labor Costs 60%!"

**says MR. A. J. GOETZ, Executive Vice President, River Raisin Paper Co., Monroe, Michigan.**

"We recently modernized our entire plant following an extensive engineering survey. New coal-burning and coal-handling equipment was installed . . . heat losses were reduced . . . efficiency raised. As a result, our fuel costs have been cut 45 to 50%—proving to us that you just can't beat bituminous coal burned the modern way."



**This view shows how River Raisin has installed its modern fly-ash reinjection system at the rear of the boilers but outside the plant. The plant also features outdoor coal handling to save additional interior space.**



**"We chose these modern spreader stokers for their advantages of low maintenance, low power requirements, and their ability to meet fairly rapid load changes. They give us maximum efficiency under all operating conditions."**

**Modernizing your present plant?** Building a new one? In either case let a consulting engineer show you exactly how you can meet your *specific* needs with a modern coal installation—and at the same time save more money than you thought possible.

Automatic coal- and ash-handling equipment can cut your labor costs to a minimum. And, today, with a modern combustion installation, you can actually get 10 to 40% more power from each ton of coal than was possible a few years ago.

Moreover, with coal you'll never have to worry about a shortage of fuel. America's coal reserves are virtually inexhaustible, and this coal is mined by one of America's most efficient and productive industries. This means that coal users—unlike those committed to other fuels—get the advantage of dependable future supply as well as more stable prices.

**If you operate a steam plant, you can't afford to ignore these facts!**

**COAL** in most places is today's lowest-cost fuel.

**COAL** resources in America are adequate for all needs—*for hundreds of years to come.*

**COAL** production in the U. S. A. is highly mechanized and by far the most efficient in the world.

**COAL** prices will therefore remain the most stable of all fuels.

**COAL** is the safest fuel to store and use.

**COAL** is the fuel that industry counts on more and more—for with modern combustion and handling equipment, the inherent advantages of well-prepared coal net even bigger savings.

**BITUMINOUS COAL INSTITUTE**

A Department of National Coal Association, Washington, D. C.

*FOR HIGH EFFICIENCY FOR LOW COST*

# *YOU CAN COUNT ON COAL!*

Operators Corner

# Good "Feeding Habits" For Your Diesel Engine

By FRED J. SCHRACK
Supervisor of Service,
Industrial Power
International Harvester Co.

THE two essential items in the "food supply" of a diesel engine are clean fuel and clean air. Diesels are economical with fuel, but they suck in air like a mile runner on the last lap.

For example, a 1000-cu in. diesel engine, running at rated rpm, breathes in approximately 865 cu ft of air a minute, or more than 415,000 cu ft of air in eight hours. This is enough air to fill a building 100 ft square and four stories high.

Above all, the fuel and air fed to the diesel must be clean. Clean lubricating oil is desirable and important, but not nearly so important as clean fuel and air. That's why diesel engine manufacturers lavish such care on the design and manufacture of fuel filters and air cleaners. Without these units, the rugged, durable diesel would strangle itself, choked by dirty air or damaged internally by foreign matter in the fuel. These are reasons why it pays big dividends to provide proper storage for fuel and give regular attention to the air cleaner.

Naturally, it is smart practice to use only the grade of fuel recommended by the manufacturer. Some fuel suppliers will offer substitutes that are "just as good" to hear them tell it. But the recommended grade of fuel will produce the amount of horsepower at the drawbar which the manufacturer guarantees. It doesn't make sense to use inferior fuels and thereby lose power.

## Store Fuel Carefully

Buying good fuel is only the first step toward insuring proper food for your diesel. Proper storage of fuel is equally important. Fuel may be properly stored either above or below ground, but the latter method is preferred since underground temperatures are more constant and there will be less condensation in the tank. However, in either method, provision should be made for accumulation and removal of water and sediment from the tank. A drain at the base of the tank should be provided to remove periodically the water and sediment that settles there.

The pump suction pipe should not reach this part of the tank so that there will be no chance of sucking up water when pumping fuel from the tank into tractors or other machinery. A screen filter should be provided in the storage tank filler neck, and, of course, the filler opening should be kept carefully capped. Also, the nozzle of the fuel tank hose should be hung in a protected place so that dirt and water cannot enter the supply from that end.

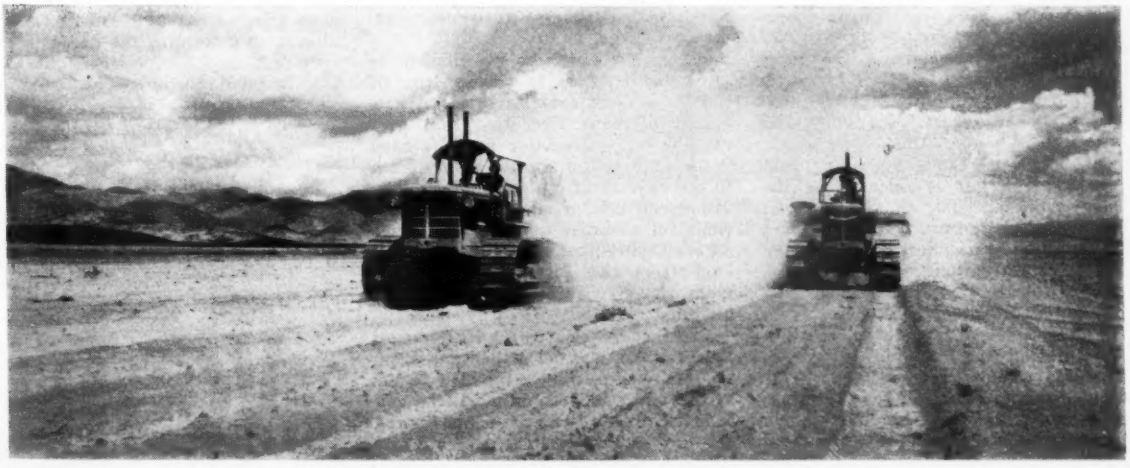
Occasionally, fuel from small containers is emptied into the storage tank. This is bad practice since these small amounts of fuel often contain some gasoline or kerosene, and even in small quantities these can contaminate the entire fuel supply in the storage tank. It is far better to use this fuel to wash parts or dispose of it.

Watch the glass water trap in your tractor engine. If water is accumulating in these traps at a rapid rate, it's a pretty good indication that contamination is taking place where the fuel is stored.

All these precautions add to the life and efficiency of the fuel filters which guard the injection systems of your diesel engines.

## Finer Than a Watch

Fuel filters are the final guardians of the diesel engine's food supply. They must be nearly 100 percent efficient to prevent foreign matter from entering the injection system where the extremely close tolerances cannot accept it. A diesel injection pump is built to precision tolerances finer than the finest watch, and like a watch, ceases to work when dirty.



Cleanliness is password to efficiency in diesel operation

There are no rigid rules for changing fuel filters, but low readings on the fuel pressure gauge ordinarily indicate a stopped-up fuel filter. If the filter must be changed, replace it with the type approved by the manufacturer. Be very careful to insure positive sealing so that the filter will work efficiently. Poor sealing makes the best fuel filter almost useless. However, you won't have to change fuel filters very often if your fuel supply is properly stored and cared for. Since fuel filters are not cheap, it pays to store fuel properly.

The other important item in a diesel's diet is air, and that, too, must be kept clean before the engine breathes it. Diesel engine manufacturers design and build adequate air cleaners into their products so that the engine will get enough clean air to develop its full rated horsepower.

### Use Clean Air

In open pit mines the air is frequently extremely dusty. Under such conditions it is wise practice to extend the air cleaner intake pipe so that it will reach the cleaner air above the dust level. Erroneous claims have been made that extended air cleaner pipes tend to smother an engine. Actually, the opposite is true, since there is a greater column of air in the extended pipe.

Under dusty operating conditions, it is important to clean out the air cleaner at frequent intervals. The oil tray should be removed and washed and then filled to the proper level with the weight of oil recommended by the manufacturer. But oil changing alone is not enough. Be sure to remove the screens in the upper portion of the air cleaner and wash them in kerosene before replacing them. To insure a thorough job, follow the manufacturer's instructions in the owner's manual.

### Air Leaks Are Bad

Even though the air cleaner is functioning perfectly, there are other spots which can develop air leaks and allow dirty air to enter the engine. For example, leaks are likely to develop at the connection between the air cleaner and the intake manifold and between the intake manifold and the cylinder head which is sealed by gaskets. These points should be checked at frequent intervals by taking an oil "squirt" can filled with water or kerosene and squirting this fluid around the joints. If any liquid is sucked into the engine, there is an air leak at that spot. Such air leaks demand immediate repair to prevent serious damage to the engine.

The precautions mentioned here are not time consuming and require little effort. Yet they will extend the life and increase the efficiency of your diesel engines to a remarkable degree. The diesel's diet demands scrupulously clean fuel and clean air. "Keep 'em Clean" is the watchword for these items. By giving proper attention to the numerous devices designed to protect the fuel and air supply from contamination, you can be sure that your diesel will be a "healthy" and husky worker as it hums a sweet song of power that gets the tough jobs done.

# Christopher Coal Co. Sponsors Coal Bed Degasification Studies at West Virginia University

THE Christopher Coal Co. of Pursglove, W. Va., a member of the Pittsburgh Consolidation group and a major producer of coal from the Pittsburgh coal bed in West Virginia, is sponsoring a study of "Characteristics of the Pittsburgh Coal Bed and Associated Strata as Related to the Emission of Combustible Gases and the Possible Degasification of Coal Beds in Advance of Mining." The work is under the direction of the School of Mines at West Virginia University and the field tests are on the property of the sponsoring company at Pursglove.

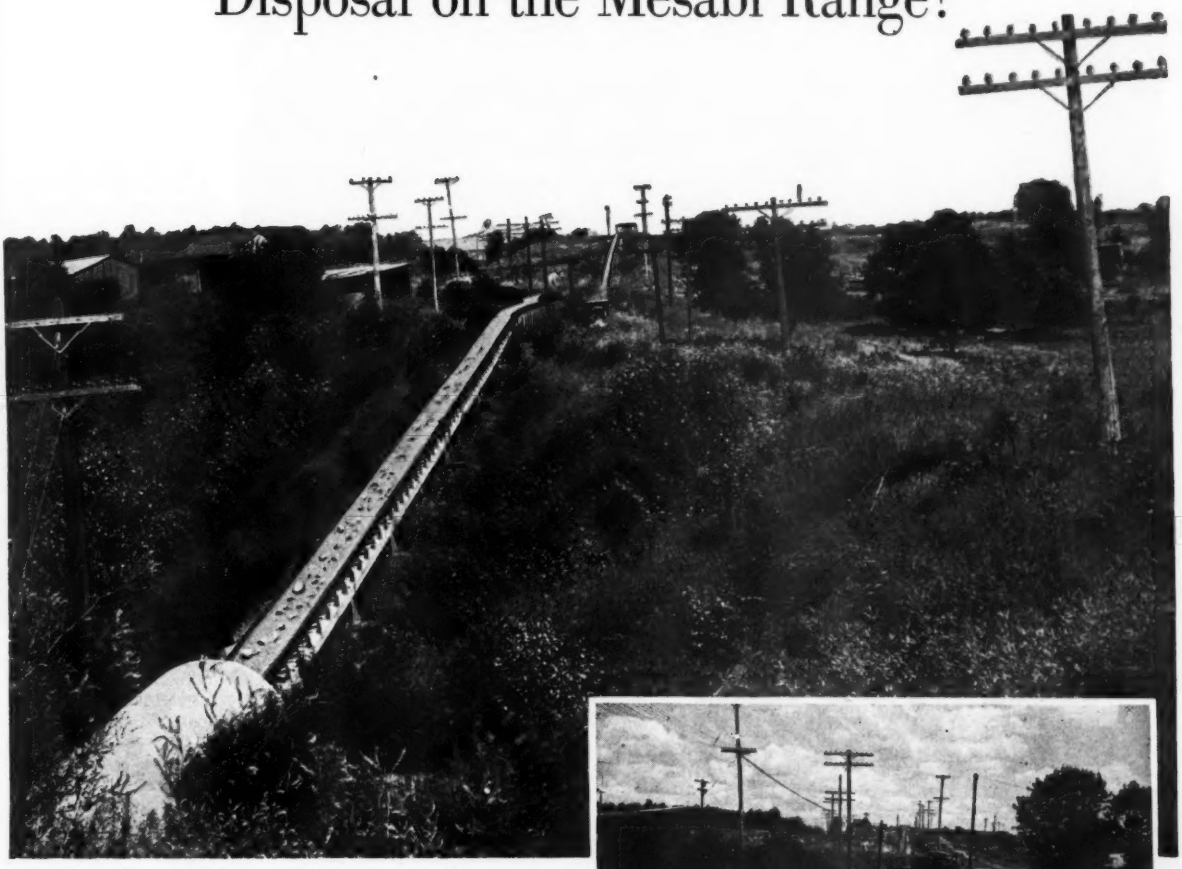
Methane is present in varying quantities in almost all bituminous coal deposits as an entrapped gas in the coal and the immediately adjacent strata. The gas is released as the coal is mined and, in the case of underground mining, becomes a part of the mine atmosphere where it may represent an ignition or explosion hazard if not diluted and removed by circulated fresh air currents. It is the only common combustible gas encountered in coal mining and its dilution and removal is one of the principal functions of mine ventilation. The primary purpose of the studies in progress is the promotion of safety in the mining of gaseous coal beds through the degasification of the coal beds and adjacent strata in advance of mining. The study is of particular importance to future mining in the Pittsburgh coal seam in northern West Virginia in that the principal virgin reserves of that seam extends westward from the present development adjacent to the Monongahela River with increasing depth of overburden and the prospect of greater gas liberation characterizing the westward extension.

At the present time two drill holes from the surface to the horizon of the Pittsburgh coal have shown sustained methane liberation and give promise of appreciable gas drainage from the coal bed and adjacent strata in the vicinity of the drill holes. Provisions have been made in the initial wells for selective quantity and pressure measurement of the gases liberated from the Pittsburgh coal and from the Sewickley coal bed 90 ft above.

From these two drill holes and others which may be drilled and from a shaft opening just completed to the Pittsburgh coal bed, data will be collected with respect to permeability and gas flow characteristics. Specifically it is planned to supplement the normal gas flow and gas pressures by: (a) Establishment of vacuum in the experimental drill holes. (b) Application of booster pressures on one or more drill holes selected as input wells with suitable tracers to identify movement to the discharge hole or holes. (c) Shooting one or more of the drill holes to determine possible effects on gas drainage.

Finally it is planned to open the area affected through underground mining to determine the extent of gas reduction and the physical effects of the blast and other phases of the work.

# What's U. S. Rubber doing for Overburden Disposal on the Mesabi Range?



This U.S. Giant Style XN Conveyor Belt forms the most important link in an overburden disposal system on the Mesabi Range. It hauls 900 tons per hour of overburden at 500 feet per minute through a distance of 2000 feet, over and under railroads, over roads and rough terrain. The excellent belt troughability is created by using Nylon in the transverse direction of the belt. This results in ease of training, true running and elimination of spillage.

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**Large photo shows** versatility of U.S. Giant Style XN Conveyor Belt carrying "overburden" over and under Mesabi contours. Small photo shows close-up of this 2000 ft. center belt. Notice troughability and perfect belt alignment.

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## As Viewed by A. W. DICKINSON of the American Mining Congress

THE 82nd Congress adjourned sine die July 7 after rushing through major appropriations measures. Barring a call for a special session by the President to consider further anti-inflation controls, Congress will not meet again until January 3, 1953.

Meanwhile, with the national political conventions completed and the party platforms before the public, the coming session of the 83rd Congress can be expected to bring forth a welter of labor, social security, revenue and other legislation to make a busy two years for the returning members of the House and Senate—with many new faces on the important committees.

### Party Platforms

The Republican Party Convention on July 10 adopted a 1952 campaign platform which calls for the following points of interest to the mining industry:

(1) Reduction of expenditures by the elimination of waste and extravagance so that the budget will be balanced and a general tax reduction can be made; (2) an immediate study directed toward reallocation of fields of taxation between the Federal, State and municipal governments so as to allow greater fiscal freedom to the States and municipalities, thus minimizing double taxation and enabling the various divisions of government to meet their obligations more efficiently; (3) a thorough revision and clarification of the present internal revenue law; (4) administration of the tax laws free from politics, favoritism and corruption; (5) a Federal reserve system exercising its functions in the money and credit system without pressure for political purposes from the Treasury or the White House; (6) to restore a domestic economy, and to use our influence for a world economy, of such stability as will permit the realization of our aim of a dollar on a fully convertible gold basis.

The platform calls for continuation of the Taft-Hartley Act with such modifications as time and experience show to be desirable, and which will further protect the rights of labor, management and the public.

As to natural resources, the platform calls for a full and orderly program for their development and conservation. It deplores the allowance of special premiums to foreign producers of minerals available in the United States. It favors reasonable depletion allowances, sound defense procurement policies, designed to develop adequate land, air, and sea forces, synthetic fuels research, and public land policies, including good faith in administration of our mining laws. Approval is given to the stockpiling of strategic and critical raw materials and to special premium incentives for their domestic exploration and development.

The Democratic National Convention on July 24 adopted a platform calling for:

(1) Keeping Government expenditures to the lowest possible level; (2) fair and equitable taxation; (3) opposing a Federal general sales tax; (4) tax reductions for lower incomes as rapidly as defense requirements permit; (5) elimination of tax loopholes which favor special groups; (6) vigorous enforcement of the anti-trust laws; and (7) strengthening of anti-inflation laws.

The platform strongly advocates repeal of the Taft-Hartley Act, charging the inadequacy of the act to meet with national emergency situations. It calls for a new legislative approach to the entire labor-management problem.

The Democratic Party platform also declares that the United States must redouble its "conservation efforts" in order to prevent it from becoming "a have-not nation in some of the most important raw materials upon which depend our industries, agriculture, employment and high standard of living."

As to minerals and fuels the platform states, "The Nation's minerals and fuels are essential to the national defense and development of our country. We pledge the adoption of policies which will further encourage the exploration and development of additional reserves of our mineral resources. We subscribe to the principles of the Stockpiling Act and will lend our efforts to strengthening and expanding its provisions and those of the Defense Production Act to meet our military and civilian needs. Additional access roads should be constructed with Government aid. Our synthetic fuels including monetary metals research program should go forward. Laws to aid and assist these objectives will be advocated."

★ ★ ★ ★ ★ ★ ★

### Washington Highlights

**CONGRESS:** Adjourned July 7.
**PLATFORMS:** Outline Parties' Positions.
**COAL MINE SAFETY:** New Bill Now Law.
**TAX:** Full Depletion for Fiscal Year Taxpayers.
**TAFT-HARTLEY:** Non-Communist Affidavits.
**BUDGET:** House Initiates Study.
**WAGE STABILIZATION:** New Board Named.
**PALEY REPORT:** NSRB Begins Study.
**COAL WAGE CONTRACTS:** Negotiations Under Way.
**ZINC DUTY:** Restored.
**RENEGOTIATION:** Cement Exempted.

★ ★ ★ ★ ★ ★ ★

### Coal Mine Inspection

The Neely (Dem., W. Va.) Federal Coal Mines Inspection Act became law July 16—Public Law 552, 82nd Congress, Second Session. The Act is really the McConnell (Rep., Pa.) bill, H. R. 7408, discussed in previous issues. It amends the Coal Mines Inspection Act of May 7, 1941, for the purpose of preventing major disasters. Specific minimum standards are written into the law directed to roof support, ventilation, coal dust and rock dust, electrical equipment, fire protec-

tion, and miscellaneous hazards. State participation in the inspection of coal mines is definitely provided for and it is emphasized that the Act shall not conflict with State mine safety laws, where such laws are more stringent.

U. S. Bureau of Mines officials are proceeding with an educational campaign in order that the new law may be intelligently administered.

## Tax

In its final hours the late Congress passed and on July 21 the President approved Public Law 594, which carries an amendment by Senator McKellar (Dem., Tenn.) making the new or increased percentage depletion allowances of the Revenue Act of 1951 available to fiscal year taxpayers for the full calendar year 1951.

Section 319 of the 1951 Act, which increased percentage depletion allowances for coal to 10 percent and extended percentage depletion to various new minerals, was made applicable by that Act only to taxable years beginning after December 31, 1950, thus denying benefits of the new section to a fiscal year taxpayer for a portion of the calendar year 1951. Public Law 594 corrects this inequity by providing that in the case of a taxable year beginning before January 1, 1951, and ending after December 31, 1950, allowance for percentage depletion under Section 144(b) (4) of the Internal Revenue Code shall be an amount which permits the depletion allowances and increases granted by the Revenue Act of 1951 to apply with respect to the part of the taxable year ending in 1951 on a prorata basis.

The staff of the Joint Committee on Internal Revenue Taxation is currently engaged in the collection and analysis of suggestions for improvements in Federal tax laws and their administration. The staff has called upon interested individuals, associations and other groups for specific suggestions as to improvement in the tax law and its administration. After reviewing the suggestions, the Committee is expected to make a full report to the House Ways and Means Committee and the Senate Finance Committee for their consideration at the next Congress in connection with any revision of the revenue laws.

## Taft-Hartley Recommendations

The staff of the Senate's Labor-Management Committee has prepared a report on the Taft-Hartley Act recommending that the provision of the Act requiring the signing of non-Communist affidavits be eliminated. The report found no fault with the National Labor Relations Board's administration of the law, but declared that changes should be made to speed the disposition of unfair labor practices cases and the like. It stated that between 469 and 489 days are now required to dispose of an unfair labor practice case, and more than a year additional to obtain compliance through the courts. It added that between 70 and 140 days are now needed to dispose of a case involving determination of the collective bargaining agent.

The report declared that the non-Communist affidavit provision "is serving no practical purpose." It said the staff had found that Communist party members have made a practice of signing affidavits and that the law's provision had not prevented unions controlled by those known to have Communist leanings from using the facilities of the N.L.R.B.

## Budget Study

The House Appropriations Committee has established a professional staff to conduct studies of government agencies and government programs to determine sources of waste, extravagance and inefficiency, and to make recommendations to the Committee for substantial cuts in federal requests for funds.

Chairman Cannon has appointed former special assistant attorney general John Donnelly as director of the professional staff. Donnelly is recruiting a staff to consist of 20 lawyers, accountants, engineers and economists. It is expected that their services will be augmented by agents loaned to the Committee by the Federal Bureau of Investigation.

The data compiled by the investigators and their recommendations for economies will be made available to all the subcommittees of the Appropriations group on a continuing basis. Members of the professional staff will sit with the appropriations subcommittees during budget hearings to advise committee members and to aid in the questioning of Federal officials seeking funds for operation of their agencies.

## Wage Stabilization

Carrying out the mandate of Congress as expressed in the amended Defense Production Act, President Truman on July 25 issued an executive order creating a new Wage Stabilization Board composed of six members each from the general public, industry and labor. The order also placed supervision of the Board under the direction of the Economic Stabilization Administrator.

Following on the heels of this order, the President on July 30 announced the appointment of 14 members to the new Board. All are subject to Senate confirmation. Named as Chairman of the Board and as a public member was Archibald Cox, a Harvard Law School professor. The other public members named at that time were: Paul N. Guthrie, economics professor from the University of North Carolina, Thomas F. Coman, a reporter for the Bureau of National Affairs of Washington, and Harold L. Enarson, a member of the staff of the Office of Defense Mobilization. Two other public members are yet to be named.

Four of the six industry members were also appointed, and the other two are to be named at a later date. Those who will serve on the Board are Malcolm L. Denise, associate industrial relations counsel for Ford Motor Co.; Hiram S. Hall, consultant for Bigelow-Sanford Carpet Co.; Hoey A. Hennessey, assistant to the director of the National Association of Manufacturers, and Millard E. Stone, director of industrial relations for Bendix Aviation Corp.

The labor members of the Board are as follows: Elmer E. Walker, vice-president of the International Association of Machinists (AFL), Harry C. Bates, president of the Bricklayers' Union (AFL), William C. Birthwright, Barbers' Union (AFL), Joseph Childs, vice-president of the Rubber Workers' Union (CIO), Ben C. Sigal, general counsel of the International Union of Electrical Workers (CIO) and John Brophy of the CIO national headquarters.

The old Wage Board expired July 29 and the new Board assumed control the following day.

## Materials Resource Study

Shortly after the Paley Commission had made public its observations and recommendations for a long-range U. S. resource program, Chairman Gorrie, of the National Security Resources Board, organized a special task force, under the direction of the head of N.S.R.B.'s Office of Natural Resources, William H. Stead, to carry out a further study of the nation's materials resources.

Included in this task force are representatives of 25 major departments and agencies of the Federal government, including the Department of the Interior, Atomic Energy Commission, Defense Production Administration, Defense Materials Procurement Agency, and the General Services Administration.

This special task force was requested by President Truman to make a detailed study of the Paley Commission report and give him its own suggestions early this Fall. This group will also have the task of deciding upon ways and means of placing the Paley Commission's recommendations into effect.

## Coal Wage Contracts

Following on the heels of the settlement of the costly steel strike, U.M.W.A. President John L. Lewis gave notice to bituminous and anthracite coal operators terminating the present

(*Continued on page* 140)

## Roof Bolting In Butte Mines

(*Continued from page* 56)

sary to prevent the bit end of the steel from wearing out the cylinder bottom. The nut that comes with the bolt fits into the cylinder at the top of the driving tool and transmits the driving impact to the bolt.

Air driven impact wrenches are highly recommended for tightening the nuts, because they are faster, and more important, they assure adequate tightness.

A 30-lb impact wrench is capable of putting a strain of from 13 to 16 tons on a rock bolt, hence its use will reveal improperly anchored bolts.

### Pull Testing

Pull testing in Butte is done with the Continental Model BT-252 hydraulic roof bolt puller. The purposes of pull testing are:

(1) *To ascertain whether or not effective anchorage is being made.* Slippage may be recognized by a sudden drop of the gauge needle. A rifle-like report or a loud grating sound also accompanies slippage. The elastic limit of one-in. mild steel bolts is usually reached at a 16-ton pull with elongation taking place as the strain is increased to the breaking point.

(2) *To evaluate the quality and characteristics of the bolts in use.* The elastic limit of one-in. bolts should be at least 16 tons and the breaking point 20 tons.

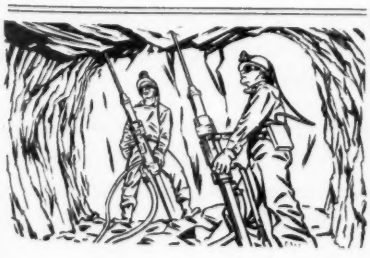
(3) *To evaluate the effectiveness of the driving equipment.* Considerable force and impact are required to enlarge the hole for good anchorage.

(4) *To give supervisors and miners confidence in the rock bolts where confidence is merited.*

(5) *To test impact wrenches.* This is done by applying the impact wrench to the strain nut of the pull tester and noting the gauge reading when the wrench refuses.

### Conclusion

The idea of using the bolt to suspend rock is erroneous. It should key loose rocks into a self-supporting structure. The prime consideration in rock bolting igneous rock is to place bolts so they will keep the ground firm, and self-supporting, and to prevent progressive sloughing.



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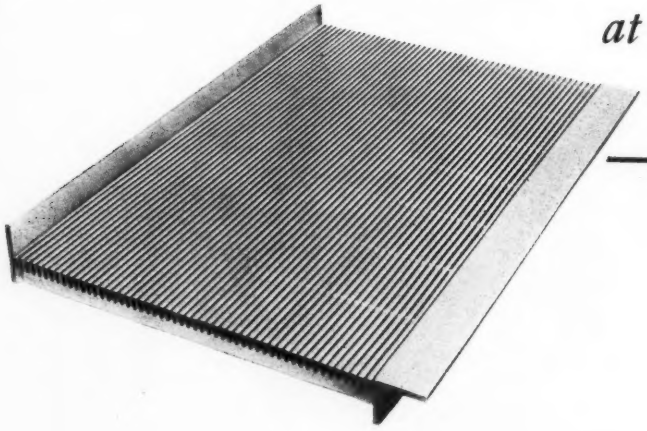

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# AMC Personals

**Robert E. Dwyer**, executive vice-president of Anaconda Copper Mining Co. since 1940, was recently elected president of the company. He succeeds the late William H. Hoover who died in Butte, Montana, on June 6.

At the same time several other promotions were announced. **Clyde E. Weed** was moved from vice-president in charge of mining operations to vice-president in charge of operations of Anaconda, and named vice-president of Chile Copper Co., Chile Exploration Co. and Andes Copper Mining Co. **Edward S. McGlone**, vice-president in charge of the western operations of the company, was elected to the post of executive vice-president and elected a director of the company, succeeding Mr. W. H. Hoover. **Chester H. Steele**, general manager of western mining operations, advanced to vice-president in charge of the western operations, succeeding McGlone.

R. E. Dwyer

C. E. Weed

E. S. McGlone

C. H. Steele

**James T. Finlen**, member of the legal staff of Anaconda since 1928, has been named western general counsel for the company. **Sam Stephenson, Jr.**, who has been a member of the legal staff since 1945, will head a new division of the legal department to be known as the Western Labor Relations Department.

**Rufus Morris** is now general tipple foreman of the coal mine at Widen succeeding **George N. Perkins**, resigned, according to an announcement by Harry L. Gandy, assistant to the president of Elk River Coal and Lumber Co. Morris was formerly with Warner Collieries at Mammoth, W. Va.

Tennessee Coal and Iron Division of U. S. Steel has appointed **William C. McKenzie, Jr.**, to the newly created position of senior staff engineer, raw materials division. He is advanced from chief engineer, raw materials division.

**Leland H. Johnson**, formerly mining engineer of the ore mines and quarries, has succeeded McKenzie as chief engineer of that division.

**James D. F. Evans** replaces Johnson as mining engineer.

George A. Roos, vice-president, The Philadelphia and Reading Coal and Iron Co., has announced the appointment of **Wesley I. Heer**, as electrical engineer of P and R. Heer, who succeeded the late Albert Brown, began his new duties July 1.

Heer comes to the Coal and Iron Company from General Electric Co. Prior to going with General Electric in 1951, he was associated with the Veta Mines, Inc., a gold-silver-lead mine in Telluride, Colo.

At a recent stockholders' meeting of New Park Mining Co., **Clark L. Wilson**, former superintendent of mines, was named first vice-president and manager of operations for the company. **Peter Joralemon**, former assistant superintendent, was made superintendent, succeeding Wilson.

**William H. Barrett** has resigned his positions with the Lorain Coal & Dock Co. and the Lorado Coal Mining Co. His duties as executive assistant to the President have been taken over by **Stanley Johnson, Jr.**, and his place as a director has been taken by **Frank A. Burke**, director of sales.

Freeport Sulphur Co. has elected four new vice-presidents, according to an announcement by Langbourne M. Williams, Jr., president of the company. The new officials are **Z. W. Bartlett**, assistant general manager of Freeport's southern operations with offices in New Orleans; **J. C. Carrington**, formerly assistant to the president in New York; **H. C. Petersen**, head of the company's oil and gas division in Houston; and **K. T. Price**, manager of its Louisiana division with headquarters in Port Sulphur, La.

**G. Howard LeFevre** has been promoted to the office of vice-president and manager of metal sales of the New York sales office of the U. S. Smelting Refining and Mining Co. He had held the post of manager of metal sales.

**R. L. Sutherland** of the Truax-Traer Coal Co. left recently for Ankara, Turkey, where he will assist that country in the production and utilization of its lignite coals. Sutherland is on loan to the Mutual Security Administration for this assignment. MSA selected Sutherland as the outstanding combustion and research consultant with complete experience in all phases of lignite production. His assignment in Turkey is expected to require three to four months.

**Evan Just**, vice-president of Cyprus Mines Corp. has established offices for the company at 161 East 42nd St., New York 17, N. Y.

**R. E. Schaeffer** has resigned as president of Baukol-Noonan, Inc. The corporation, including the Baukol-Noonan Lignite, Inc., operates a lignite strip mine in an 800-acre area, one mile east of Noonan, N. D. Schaeffer has been president and a director of the corporation since its formation in 1949. He plans to devote his time to research into industrial uses of lignite.

**John P. Burrows** has been appointed general purchasing agent of International Minerals & Chemical Corp.

Burrows joined International's Florida Phosphate Division in 1933 as an engineer. In 1937 he was transferred to the company's Potash Division and served as an engineer at Carlsbad, N. M., for that division until 1939.

**Edward A. Lynch**, of Pottsville, has announced the opening, July 15, of an office at 302 Schuylkill Trust Building, Pottsville, Pa., for the practice of public relations and industrial relations to management. Lynch has served as director of personnel and public relations of the Philadelphia and Reading Coal and Iron Co. since October 1, 1945. He will continue to serve the P. & R. Co. in these matters as a client.

**James D. Francis** has relinquished active duties as senior executive officer of the Island Creek Coal Co. and Pond Creek Pocahontas Co. **Raymond E. Salvati**, who has been with these companies 30 years and has held the position of president and chief administrative officer of both since 1949, will take over the executive duties heretofore performed by Francis, who will remain as a member of the board of directors and the Executive Committee of the two companies.

J. D. Francis

R. E. Salvati

In addition to the above change, **Carlton R. Mabley, Jr.**, was elected vice-president and general manager of Island Creek Coal Sales Co. **William C. Nelson** was appointed assistant to the president of Island Creek Coal Co. and Pond Creek Pocahontas Co., effective July 1.

**Jacob Vandenberg** and **John S. Holland** have joined the mining department of the National Lead Co. Vandenberg was formerly managing director of the Holland Metallurgical Works in Arnhem, Netherlands. Holland was transferred to New York from the MacIntyre development of National Lead Co., where he was chief geologist.

Appointment of **Robert L. McMurtrie** as chief of the Lignite Branch of the Region V Fuels Technology Division and to superintendent of the Charles R. Robertson Lignite Research Laboratory, Bureau of Mines, Department of the Interior, has been announced.

In his dual job, a new position on the staff of the lignite laboratory, McMurtrie will work directly under Alex C. Burr, chief of the Bureau's Region V Fuels Technology Division.

A number of changes have been made in the various departments of Kennecott Copper Corp. James Boyd, exploration manager announced that **Annan Cook**, who has been with Kennecott Copper Corp.'s Exploration Department for the past three years, has been appointed district geologist for the eastern states. **Lowell B. Moon**, who joined the department in January of this year, after resigning as chief of the Minerals Division of the Bureau of Mines, has been appointed district geologist for the northwestern states. **Donald D. Smythe**, who has been with the department for the past four years, was named district geologist for the southwestern states. **C. H. Burgess** joined the exploration staff and will serve as district geologist for the central states. **Ralph C. Homer** joined as chief geophysicist. For the past five years he has been teaching geophysics at the Colorado School of Mines. **Julian W. Feiss**, formerly assistant to deputy defense materials procurement administrator, was appointed staff geologist of the exploration department. A graduate of Princeton and Arizona universities, he has had extensive experience in the mining industry in the United States and Africa. He served with distinction as a major in the army during the war and thereafter for two years was editor of MINING CONGRESS JOURNAL. Entering Government service he became assistant to the director of the Bureau of Mines, and subsequently assistant to the director of Defense Minerals Administration.

**Gordon B. Russell** has been appointed comptroller and **Willard R. Kimsey**, assistant comptroller of Kennecott according to an announcement by Charles R. Cox, president. Since January, 1950, **E. S. Hann**, treasurer, has performed the comptroller's functions in addition to the other duties of his office. Russell has been with the company since 1941 and has served as assistant treasurer and assistant secretary since November, 1949. Kimsey has been with the corporation since 1935 and has served as assistant treasurer since May of last year.

**Howard B. Gundersen** has been advanced from supervisor of training to assistant director of industrial relations in the Utah Copper Division of Kennecott Copper Corp.

**Ned H. Snyder**, supervising engineer of the Fuel Inspection Section of the Bureau of Mines, retired on June 30 after more than 45 years of Government service.

**LaMar W. Lamb** is the new general manager for Bonanza Mining Co., Wenden, Ariz.

**Robert D. Longyear** has returned from a four months' trip through Africa, Europe, England and Scotland. During his trip he visited mining and construction operations in South Africa, Northern Rhodesia, Nigeria, Morocco, Algiers, Cyprus, France, and West Germany.

## — *Obituaries* —

**Raymond E. Brown**, 74, prominent engineer in the heavy bulk materials handling equipment field for many years, died at his home in Pittsburgh, Pa., following a prolonged illness.

Mr. Brown graduated from Case Institute of Technology in 1899 as mechanical engineer and joined the Brown Hoist Machinery Co. In 1904 he joined Heyl & Patterson, Inc., where he stayed until his semi-retirement in 1948. He served as consulting engineer for Heyl & Patterson from 1948 until his death.

During his career with Heyl & Patterson he was responsible for many improvements and patents in heavy bulk materials handling equipment. He was regarded throughout the industry as an authority in this field.

**William Luther Lewis**, 68, president of the Chicago Pneumatic Tool Co., died recently. A native of Wales, Mr. Lewis was brought to this country as a boy and first worked in Bridgeport, Ohio, for a lumber company. Later he came to the attention of Charles M. Schwab, who aided his advancement. Mr. Lewis joined Bethlehem Steel and rose to assistant controller. In 1930 he was elected vice-president, secretary and treasurer of the Chicago Pneumatic Tool Co., and in 1946 he was elected president.

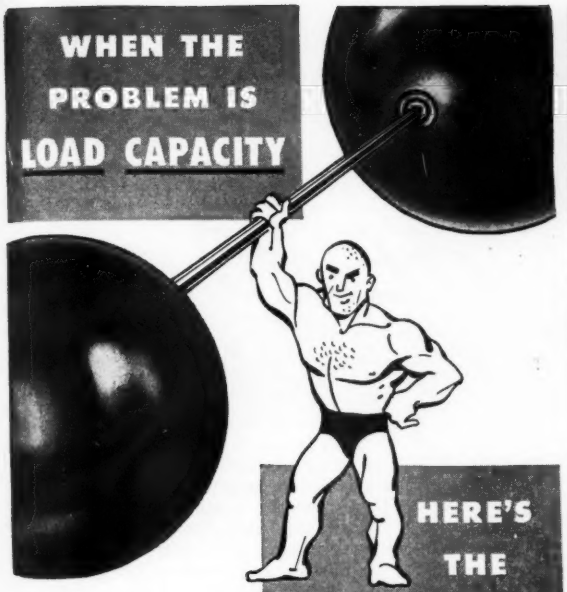
**Thomas Varley**, 72, a private mining consultant for many years, died in Salt Lake City recently. He formerly was a U. S. Bureau of Mines official.

**James L. Davidson**, for more than 25 years secretary-treasurer of the Alabama Mining Institute, died in Birmingham, Ala., recently at the age of 71.

**E. B. Leisenring**, for many years head of the Stonega Coke & Coal Co., the Westmoreland Coal Co., and the Virginia Coal & Iron Co., died recently at his home in Ardmore, Pa. He was the third generation of his family to head these companies.

**William Raymond Hocking**, well-known Pacific Northwest and Alaskan mining engineer, assayer and mine operator, died in Seattle, Wash., recently at the age of 71. Born in Cornwall, England, he had come from England when a small boy with his father, who was active in copper mining in Butte.

WHEN THE PROBLEM IS LOAD CAPACITY



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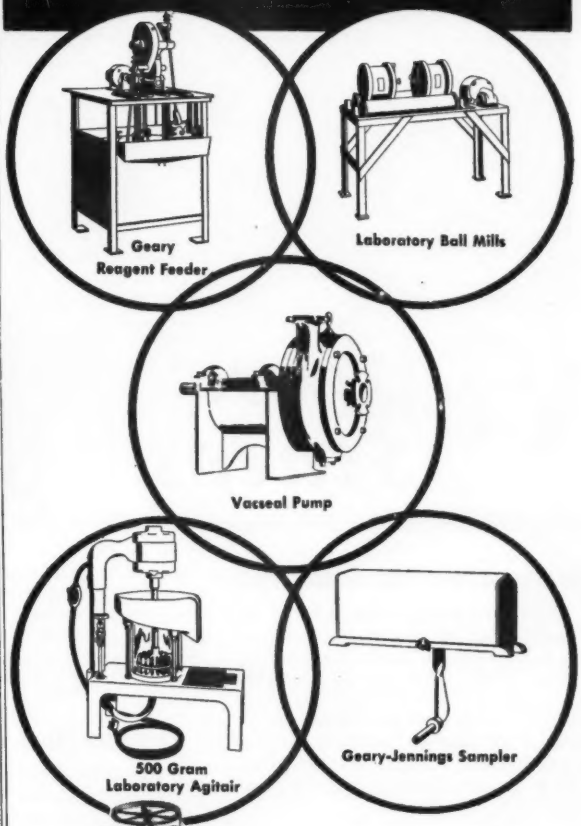


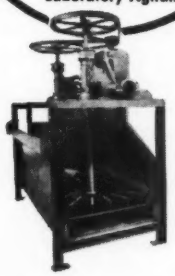

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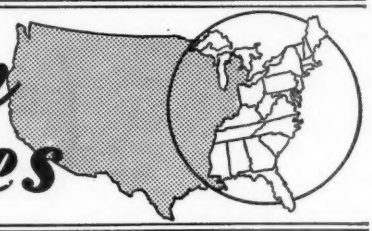
# NEWS and VIEWS

## Eastern States



### Mine Inspectors Hold Annual Meet

The 42nd Annual Convention of the Mine Inspectors' Institute of America was held in Wilkes-Barre, Pa., on June 9-10-11, 1952. Among the problems discussed at the meeting were those involved in oil and gas operations in relation to mining. John M. Malloy of Oklahoma City was elected president to succeed Arch J. Alexander of Charleston, W. Va.

### Ringwood Produces Again

Ringwood Iron Mines, Ringwood, N. J., one of the first iron mines in Colonial America, is open for business again. It was first opened in 1740. At the present time, 400 tons of iron ore are being produced daily. Eventually, officials of the Ringwood Mines plan to ship 1100 tons a day.

### Coal Exports at Near Record

Secretary of the Interior Oscar L. Chapman has announced that United States coal exports to all areas of the world in the first half of 1952 totaled close to 30,000,000 net tons, an increase of about 16 percent above the 1951 level for the same period.

Defense Solid Fuels Administrator Charles W. Connor said that exports in the first six months of this year were exceeded only by the approximately 34,000,000 tons shipped outside the United States in the corresponding period of the peak year of 1947. The major portion of export shipments overseas in 1951, however, were in the second half of the year.

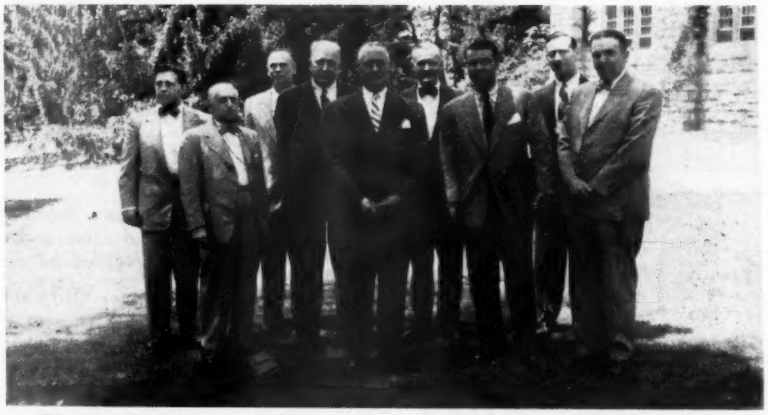
According to Mr. Connor, the export market accounted for about 11.2 percent of the coal produced in the United States during the first half of this year.

### Recognize Safety Improvements

West Virginia's Workmen's Compensation Commission has paid a very real tribute to West Virginia's coal industry. It has done so by proposing to reduce further the workmen's compensation premiums for coal mining. Last year the Commission also made a substantial reduction in the rates for coal mining. The lower rates, the Commission estimates, will amount to almost half a million dollars less than total premiums paid by coal producers in the state last year.

### Transfer Coal Holdings

A new company, Harmar Coal Co., owned jointly by Wheeling Steel Corp. and Pittsburgh Consolidation Coal Co., commenced business July 1. The new company purchased all the surface lands, plant and equipment of the Harmarville and Oakmont coal mines from the Consumers Mining Co., a wholly owned subsidiary of Wheeling Steel Corp., and leased its coal reserves. The Harmar Coal Co. will also lease additional coal acreage from the Pittsburgh Consolidation Coal Co. The new company will have coal re-



**Education Committee of the National Coal Association recently visited the Department of Mining Engineering of the Virginia Polytechnic Institute at Blacksburg, Va. The Committee was shown through the laboratories of the Mining Department and Department of Fuel Engineering. Shown in the picture left to right are: James D. Reilly, Hanna Coal Co.; Dr. M. Edmund Speare, Bituminous Coal Institute; C. R. Nailler, Christopher Coal Co.; L. I. Cothern, Jewell Ridge Coal Corp.; Henry C. Woods, Sahara Coal Co.; M. D. Cooper, National Coal Association; Stanley B. Johnson, Jr., Lorain Coal & Dock Co.; Roland C. Luther, Peerless Coal & Coke Co.; and Ray W. Beamer, Rochester & Pittsburgh Coal Co.**

serves estimated to contain approximately 60,000,000 tons of coal, all of which will be available to Wheeling Steel Corp. Pittsburgh Consolidation Coal Co. will supervise the management of the mines of the Harmar Coal Co. and employes were transferred from the Consumers Mining Co. to the new company July 1.

## Pick Taggart Winners

Ralph E. Taggart Memorial Scholarships in Mining Engineering have been awarded to two of twenty-one applicants, according to an announcement made by The Philadelphia & Reading Coal & Iron Co.

The scholarship was established in 1951 as a memorial to the late Ralph E. Taggart, president of the Coal & Iron Co. for fifteen years. A full scholarship, the award is open to graduates finishing in the upper half of their classes of all high schools located within the P. & R. Co.'s three operating divisions. The winners may choose from among the mining schools of Pennsylvania State College, Lafayette College, or Lehigh University.

The winners of the two scholarships are Thomas V. Falkie, Mount Carmel, Pa., and Carl Tilmont, Centralia, Pa.

Officials of the P. & R. Co. pointed out that it is not customary procedure to award more than one scholarship each year but two winners were selected this year because the two boys in question finished so close in standing it was difficult to make a selection.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## Take Combination Locomotives for Example

In a combination trolley-battery locomotive, the battery is charged directly from the mine d-c power supply so that charge rates are not critically controlled. EDISON Nickel-Iron-Alkaline Storage Batteries meet this condition consistently. In fact, they can safely be charged at full normal rate at any state of charge and, for short periods of time, at even higher rates. Nor do they require equalizing charges. When used in straight battery locomotives, they usually can be charged in six to seven hours; this helps get the charging done during off-peak hours.

However, their non-critical charge characteristics are only one of their advantages. They are *durable mechanically:* grids, containers and other structural parts of the cells are of steel. The alkaline electrolyte is a recognized preservative of steel. They are *foolproof electrically:* they are not injured by short-circuiting, reverse-charging or similar accidents. They *withstand temperature extremes:* they are not injured by freezing at any state of charge because the density of the electrolyte does not vary appreciably with the state of charge; they are easily ventilated for rapid cooling. They can *stand idle indefinitely* without injury: they are merely discharged, short-circuited, and stored in a clean, dry place.

These characteristics add up to trouble-free operation, unequaled long life and economy per year of operation. The combination of these factors helps explain the preference of cost-conscious users. Edison Storage Battery Division of Thomas A. Edison, Incorporated, West Orange, N. J. Thomas A. Edison of Canada, Limited, Montreal.

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**Discover For Yourself** — learn how the Hewitt-Robins Eliptex Dewaterizer can help you dewater coal more efficiently — more economically. Write for Bulletin No. 129-A for complete information.

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## To Build HMS Plant

The Woodward Iron Co., Birmingham, Ala., has awarded a contract for the largest heavy media separation plant to date in the U. S. A. It is expected to have a capacity of 300 tph. Primary purpose of the separator is to sort out a siliceous parting in the main iron ore seam.

## Anthracite Safety Record

The Lehigh Navigation Coal Co. achieved first-place rank in mine safety among major anthracite producers in the first five months of 1952, according to then newly released report of the Pennylsvania Department of Mines.

With a fatality rate expressed "in terms of perfection" that attained the enviable mark of 59 percent, the company was at the top of the safety list, 21 percent ahead of the next ranking firm, Hudson Coal Co. The company's record of 59 percent compares with the region-wide rate of 16 percent.

In a letter to all anthracite mine inspectors, officials and miners, Deputy Secretary of Mines Joseph J. Walsh found cause for cheer in the safety showing of the so-called "line companies." He noted that so far in 1952, "independent" producers have had 58 percent of the fatalities, although they produced but 45 percent of the coal.

"In the face of this setback, or slipping, on the part of the small coal companies, courage and hope is found in the performance of the seven line companies," Mr. Walsh wrote. "They show a substantial improvement in their fatality rate during the first five months of 1952."

## Expand Buffalo Ore Docks

Bethlehem Steel Co., plans a major harbor and dock improvement program at Buffalo, N. Y. The program involves the erection of new ore unloading machinery and deepening of the Lackawanna Ship Canal so that larger ore vessels may tie up at its docks. A contract has been awarded for the dredging of the 4000-ft ship channel to a depth of 25 ft. The slip now has a depth of 21 ft. Operations at Bethlehem's Lackawana plant require about 5,500,000 tons of iron ore annually. Storage space will be provided for about 3,000,000 tons at a time.

## Announce Scholarship Plan

At a recent meeting of the Board of Directors of the Tennessee Products & Chemical Corp. a plan for the establishment of a college scholarship fund for employes' children was approved. Under the program, five scholarships will be awarded each year to deserving high school graduates—sons and daughters of Tennes-

see Products employes. In recognition of Mr. McFarlin's untiring efforts in the cause of education and the welfare of the employes, the Board directed that the fund be designated the "Carl McFarlin Educational Fund." Scholarships will be made available starting with the college year of 1952-53.

## Use Wooden Roof Bolts

A recently released U. S. Bureau of Mines Report describes how the operators of the Stony Point mine, Hopkins County, Ky., were able to save more than $27,000 in nine months by substituting wooden roof bolts for the conventional steel type. The Bureau completed its study in February, 1952. Although emphasizing that wooden roof bolts are not applicable to all mines, the Bureau's report does show that under the roof conditions at Stony Point mine wooden bolts were used successfully with great savings in cost of material.

The mine, which employs 129 men and produces about 3000 tons of coal a day, mines on the room and pillar method. The immediate roof consists of from 8 to 36 in. of hard, black shale.

The wooden bolts are three ft long and slotted at each end to receive wedges. Made at the mine, the bolts cost less than 20 cents each, compared with $1 each for steel bolts. Since use of wooden roof bolts began, 39,560 linear ft and 766,920 sq ft of roof in rooms have been supported with only two failures, neither of which resulted in injury to miners.

A free copy of Information Circular 7637, "Successful Use of Wooden Roof Bolts in the Stony Point Mine, Stony Point Coal Co., Hopkins County, Ky.," by L. W. Kelly, may be obtained from the Publications Distributions Section, Bureau of Mines, 4800 Forbes Street, Pittsburgh 13, Pa.

## Plan Lithium Expansion

H. C. Meyer, Foote Mineral Co. board chairman, has announced plans for a three-way expansion of the company's lithium production.

The program which involves $3,000,000 includes: (1) construction of the world's largest and most modern lithium chemical processing plant at Sunbright, Va., (2) trippling the output of lithium ore at its property near Kings Mountain, N. C., and (3) construction of facilities for quarrying and processing limestone at Sunbright, Va.

In announcing these plans, Meyer pointed out that Foote has pioneered in lithium chemicals for over 20 years. A shortage of lithium chemicals in this country is evidenced by the fact that Defense Production Administration has placed lithium chemicals in Group 1, the list of material which is currently insufficient to meet military and essential civilian demands.

## BCR Sells Mining Machine

The sale of rights to manufacture and market the continuous mining machine developed under the mining development program of Bituminous Coal Research, Inc., the national research agency of the bituminous coal industry, to the Le Roi Co., Milwaukee, Wis., has been announced by C. E. Lawall, chairman of the mining development program.

The Le Roi Co. plans to build and market the continuous mining machine as rapidly as possible.

Mining research, according to the announcement, will be continued by the Mining Development Committee of Bituminous Coal Research for the purpose of developing new and improved methods of bituminous coal mining. This decision was reached by the subscribers to the mining development program at a meeting in Huntington, W. Va., July 22.

## Open Maine Beryl Deposit

Beryllium Development, Inc., has begun to explore, develop and mine pegmatites in the Newry Mountain District, near Andover, Me. The work is being done with the assistance of the U. S. Government in order to develop reserves and domestic production of beryl.

Beryllium Development, Inc., is a wholly-owned subsidiary of Beryllium Corp.

## 100 Mile Drainage Tunnel

Driving a tunnel from the vicinity of Glen Lyon, Pa., to the Susquehanna River below the dam at Conowingo, Md., is one of the methods recommended for removing the water that plagues anthracite mine workings. In an effort to determine the feasibility of the proposed route, the U. S. Bureau of Mines engaged a contractor to drill holes at approximately eight-mile intervals to determine the nature of the formations through which such a tunnel would pass. Drilling data support the belief that the proposed route is feasible, according to a Bureau of Mines bulletin just released.

The bulletin discusses the advantages of tunnelling for gravity drainage as opposed to reliance upon central pumping stations for controlling water in the collieries. It summarizes geological information now available regarding the route of the tunnel and describes the drilling equipment used and the sites of the 15 boreholes.

Bureau of Mines Bulletin 513, "Core Drilling at Shaft Sites of Proposed Mine-Water Drainage Tunnel, Anthracite Region of Pennsylvania," can be obtained only from the Superintendent of Documents, United States Government Printing Office, Washington 25, D. C., for 30 cents a copy.


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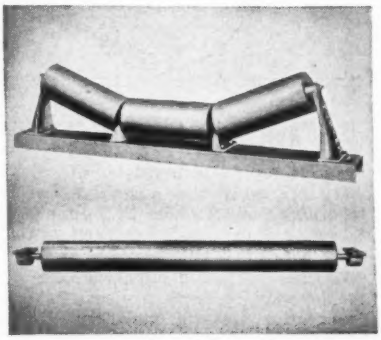

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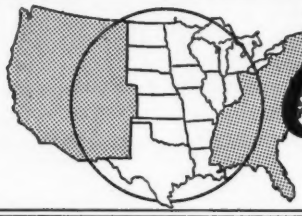

# Central States

## Research Lab Dedicated

International Minerals & Chemical Corp. opened its new general research laboratory in Skokie, Ill., June 26. Of modern, fireproof construction, the new laboratory will house a staff of scientists and technicians working on the broader research projects of the corporation, and will make it possible to centralize a large part of International's research operations.

## National Safety Congress

Roof bolting and rock dusting will highlight the coal mining sessions of the National Safety Congress and Exposition to be held in Chicago, Ill., October 20-24.

Other topics to be discussed will run the entire range of safe mine operation. All sessions, Monday through Thursday, of the Coal Mining Section will be held in the Conrad Hilton Hotel.

## Close Dodgeville Mine

The 13-year-old Dodgeville mine at Dodgeville, Wis., is now shut down after running out of ore. Sales of lead-zinc ores since the first shaft was built in 1939 have totaled nearly $3,000,000. Extensive prospecting has not turned up any new ores.

An open pit mine has been opened in the area, and ore is now being shipped to the Dodgeville mill for tests.

The Dodgeville Mining Co. will continue to sink test holes on farms in the vicinity in the hope of striking new ore bodies.

## Eagle-Picher Expands

The Eagle-Picher Co. has purchased 245,580 shares or 98.2 percent of the common stock of The Ohio Rubber Co. The Ohio Rubber Co. also has a funded debt and preferred stock which remain outstanding.

The Ohio Rubber Co., whose origin dates back to 1873, is a leading manufacturer of mechanical rubber goods and produces a wide variety of moulded and extruded rubber products sold principally to the automotive, farm equipment and toy industries. In addition, the company is presently engaged in making tank tracks in substantial volume for the defense effort. Its plants are located at Willoughby, Ohio; Conneautville, Pa.; and Long Beach, Calif.

## Truax-Traer Elects

At its Annual Meeting held July 31 in Chicago, the Truax-Traer Coal Co. made the following changes in the elective offices of the Corporation: A. H. Truax was elected chairman of the board, succeeding G. W. Traer, who will remain chairman of the executive and finance committee. R. E. Snoberger was elected president and Gregory Devine, assistant to president and vice-president. J. H. Price was made vice-president. In addition it was announced that in the West Virginia Division, E. M. Cassidy was named general manager and M. H. Schumate and Tony Taucher, Jr., were named assistant general managers of this division. Cassidy was formerly assistant general manager; Schumate was formerly general superintendent, and Taucher was formerly superintendent for the Union Pacific Coal Co. of Rock Springs, Wyo.

## World's Largest Tire

So tall you could not get it through your garage door . . . so wide that it could not go through the door of your house. That's the giant of all tires—10 ft tall and four ft wide.

It's called the special "48 by 68" built for R. G. LeTourneau for experimental use on a "swamp buggy" now undergoing development by the LeTourneau Co. at its plant at Longview,

Texas. To give it a test run even before its installation on the machine for which it was built, the company mounted a pair of these giants on the front wheels of a 35-ton capacity earthmover.

The new tire is tubeless. It is designed to operate at air pressure from 10 to 15 lb (depending upon deflection). This is less than half the air pressure normally used in a passenger car tire, and from a third to a half the air pressure used in earthmoving equipment tires, depending on size of machine.

This latest giant in the tire family is capable of carrying a tire load of 17,500 lb at 20 mph. It weighs 1482 lb. Major reason for its construction is its ability to carry big loads over soft, swampy terrain.


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## Reopen Flooded Copper Mine

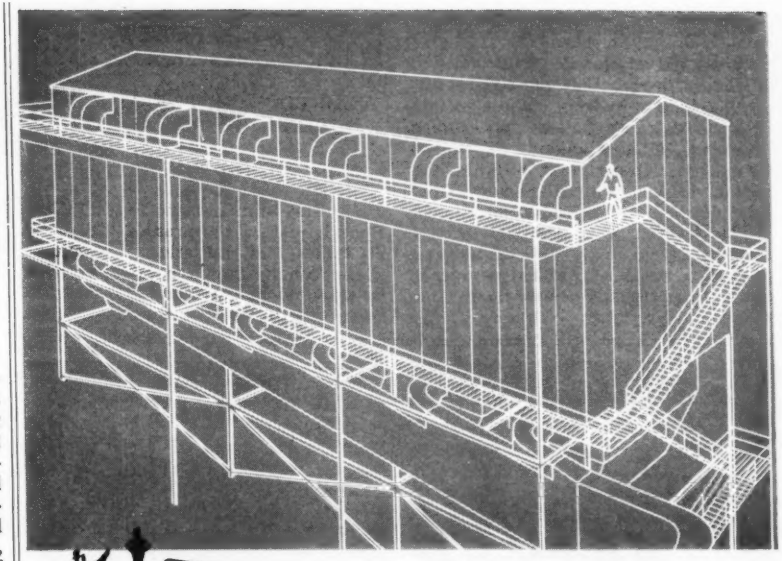
The flooded Osceola mine, in Houghton County, Mich., is to be reopened by Calumet & Hecla Consolidated Copper Co. The copper company has entered into an agreement with the Defense Materials Procurement Agency in which the Government has guaranteed a minimum price of 25¼ cents per lb for a total of 53,000 tons of copper. Production is to be at the rate of 7125 tons a year. The mine has been closed since 1931.

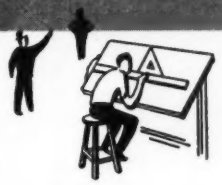
## Chances for Record Fade

An anticipated record iron ore shipment this year on the Great Lakes faded with the steel strike. Mining company officials said a check of all shipping records showed that 19,623,508 gross tons of ore had been moved when the strike put an end to shipments. That total was running ahead of last year's figure for the same date, due principally to an early opening of the shipping season on April 5. Since the strike began, the shipping companies have been dropping behind 1951 at the rate of about 340,000 tons a day. Ore companies had been talking about a 98-million-ton year in 1952.

The strike idled several thousand men employed in Duluth, but the miners in range communities were hit even harder and railroads were forced to furlough many workers.

**First high-speed, balanced, automatic hoist in the nation's coal fields, is capable of lifting 800 tons of coal up a 491-ft vertical shaft every hour. It was put into operation recently at the new Crown Mine of the Freeman Coal Mining Corp., Farmersville, Ill. The high-speed, automatic, balanced hoist, driven and controlled by General Electric apparatus, delivers eight tons of coal to the surface every 36 sec, and has a rated speed of 1357 fpm. The hoist utilizes two skips, each weighing 7½ tons, and was constructed by the Vulcan Iron Works of Wilkes-Barre, Pa.**



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## Estimate Sodium Sulfate Reserves

A report of the U. S. Bureau of Mines estimates that there are 30,439,000 tons of hydrous sodium sulfate in lakes of North Dakota and eastern Montana. Of this amount, 23,849,000 tons are in permanent beds in the lakes; 421,000 tons in brines, and 3,718,000 tons in the crusts and muds.

The deposits were sampled by Bureau personnel in the fall of 1949 as part of a study of natural resources under the Missouri River Basin Development Program.

## BOOK REVIEW

YEAR BOOK OF THE AMERICAN BUREAU OF METAL STATISTICS, *Maple Press Co., York, Pa.; 118 pages, $3.00.*

THE 31st annual issue of this Year Book is just off the presses. Made up of tables and statistics, the volume presents non-ferrous metal production figures and prices from 1951 back to when these figures were evidently first kept. Principal producers, domestic and foreign, of the following metals are listed: copper, lead, zinc, gold and silver, and miscellaneous.

The American Bureau of Metal Statistics is a non-profit statistical bureau supported by the most important producers of copper, lead and zinc in the United States and Canada and is international in scope. The Year Book contains a wealth of material and will be a valuable addition to the library of anybody who buys or sells non-ferrous metals.

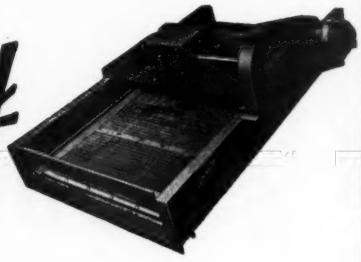
Order from the American Bureau of Metal Statistics, 50 Broadway, New York 4, N. Y. The price is $3.00 postpaid.

TECHNIQUES OF PLANT MAINTENANCE—*1952, Clapp & Poliak, Inc., 341 Madison Ave., New York 17, N. Y.; 182 pages, $6.00.*

A TRANSCRIPT of the proceedings of the technical sessions sponsored by the American Society of Mechanical Engineers and the Society for the Advancement of Management held with the Third Plant Maintenance Show in Philadelphia.

Maintenance problems are basically the same in any plant. Although the plants whose maintenance systems are described in the book are larger than most found in the mining industry, many valuable hints can be found. Question and answer sections at the end of each paper bring out many points and add much to the value of the book.


THE Leahy HEAVY DUTY NO BLIND VIBRATING SCREEN



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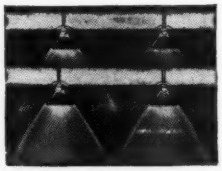
The Leahy No-Blind Vibrating Screen has distinguished itself by its ability to produce high tonnages of fine mesh screened products on long, back-breaking schedules.

First to offer the advantage of differential "snap-action" the Leahy forcibly ejects the slightly oversize particles tending to wedge in the mesh.

When it comes to the screening of damp fines, FlexElex is recommended for electrically heating screen jackets. For full information, send for Bulletin 15-J.



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## Roof Drilling

(*Continued from page* 98)

can be adapted to any type of drill.

7. The size, weight and portability of the dust collector makes it easily adaptable to the mining cycle.

8. Dust collectors are used voluntarily during the entire drilling operation (including collaring of the drill hole) and full-shift protection is realized.

9. It has been proven that the dust count, where dust collectors are used, is much lower than where wet drilling is practiced.

10. Repairs to dust collectors can be made promptly, on the section, without interfering with the mining cycle.

The dust hazard, which is and should continue to be the first consideration, is well taken care of with either wet drilling or dry-dust collectors as men can work on the return of the air split and even in the same place at the same time and not be exposed to any undue health hazards.

As soon as the U. S. Bureau of Mines gives formal approval to dust collectors, Island Creek plans to use them exclusively at their mines.

# Western States

## Another Greater Butte

According to E. S. McGlone, vice-president in charge of western operations for Anaconda Copper Mining Co., Anaconda plans a second low grade ore development program which may equal the Greater Butte project in size. He said further that the copper recovered from the low grade projects should be cheaper than that from the high grade ores when the low grade program is in full swing.

It is estimated that 130,000,000 tons of copper ore are to be recovered and treated under the Greater Butte Project.

## Federal Going Deeper

Federal Mining & Smelting Co. has completed 200 ft of shaft sinking at the Morning mine at Mullan, Idaho, and cutting of a station and pockets is now in progress. The new 5200 level will be 1060 ft below sea level, making the Morning mine the third property in the district to attain a depth of more than 1000 ft below sea level. The other two are Bunker Hill and Sunshine. The Morning vein has been worked since before the turn of the century and has yielded ore from grass roots 5680 ft above sea level to the 5000-ft level, 860 ft below sea level, a total distance of 6540 ft.

## To Study Indians' Minerals

The University of Arizona and the New Mexico School of Mines have been commissioned by the Department of the Interior to conduct a mineral study and survey on lands of the Navajo and Hopi Indian Reservations. The purpose of the study is to locate the principal economic products (except uranium) of present and future importance to the two Indian tribes. Among the materials to be sought are coal, copper, bentonite, brick and tile clay, pottery clay, fire clay, gypsum, limestone and cement rock, building stones, aggregate materials, volcanic ash and other abrasives, semi-precious stones and similar materials. The work will include mapping of mineral resource areas and publication of a bulletin.

E. D. McKee, head of the University of Arizona geology department, will supervise the Arizona part of the program, while George Kiersch, assistant professor of geology, will head a four to six-man team of researchers in the summer field work.

## Consolidated Uranium Mines Largest Producer

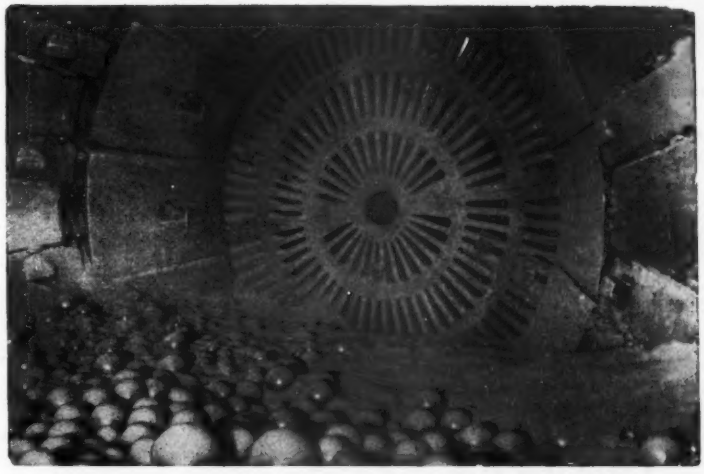
Consolidated Uranium Mines, Inc., of Salt Lake City, was the largest shipper of uranium ore during 1951 in Utah. C. A. Elggren, secretary-treasurer, reported that shipments from Temple Mountain, Emery County, fields totaled 20,034 dry tons from August, 1950 to October, 1951. Settlement values for the uranium oxide totaled $204,367 during that period. Vanadium values amounted to $69,-815. Development allowances from the Atomic Energy Commission totaled $39,510 and haulage allowances from the AEC were $122,373. Total gross revenues amounted to $440,678.

Ores shipped by Consolidated and its subsidiary, Continental Mining and Milling Co., were from leases in the Shinarump conglomerate, near Temple Mountain. The firm has 39 basic claims in the area and in addition to its own operations, has contracts with three leasors. Most of the ore was shipped to AEC's mill at Monticello, Utah. The company has contracts for delivery of ore to the Vitro Chemical Co. plant in Salt Lake City for delivery of 150 tons a week.

Values in the ore run about 0.2 percent uranium oxide on the average. About 12,000 feet of wagon drilling has been completed and an additional 40,000 feet is scheduled. The conglomerate has been penetated to a depth of about 1000 feet with present equipment. Mining is carried out in relatively small areas in the conglomerate, but it is not uncommon to find lenses with a fair amount of ore in them presenting a 15-foot face running 100 to 150 feet in length.

Operating costs are estimated at $6 to $7 a ton, with sales of 0.2 percent ore, plus allowances, averaging about $18 to $20 a ton.


NATURAL BALL SEGREGATION



Here's what you see inside a Hardinge Conical Ball Mill. This unretouched photo was snapped toward the discharge end of the mill. Notice that all the large balls are in the foreground, near the feed end of the mill (where they belong for most efficient grinding). Write for Bulletin AH-389-52.

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## Trona Plant Progresses

Intermountain Chemical Corp. has completed about one-fourth of the work on its $16,000,000 soda ash project near Green River, Wyo., it has been announced by C. A. Romano, resident manager. The initial capacity of the plant will be 300,000 tons of soda ash or trona a year. Initial output will represent approximately six percent of the 1949 soda ash consumption in the country. Mr. Romano has announced that additional trona beds have been found at the company's Church Buttes, Wyo., gas fields.

## Mananese Depot for Arizona

A purchase depot has been established at Wenden, Ariz., to which miners and producers can ship domestic manganese ore for purchase by the Government.

Ore delivered at the Wenden depot must contain a minimum of 15 percent manganese to be acceptable under the regulations for setting up the depot. Five long tons of ore is the least that will be accepted in a single shipment. Moreover, the ore will be purchased only from miners or producers who have notified the Government in advance of their intention to take part in the program.

Prices to be paid for the ore will be computed on the basis of $2.30 per long ton unit of recoverable manganese, less handling and treatment costs. The actual amounts paid are determined by a number of conditions as set forth in the regulation establishing the depot, copies of which will be available shortly from the GSA regional office, Building 41, Denver, Colo.

## Klein Mine Shut-Down

The Milwaukee Railroad has closed its Klein No. 2 coal mine near Roundup, Mont., because of the general decrease in demand for coal. An official of the Republic Coal Co., which operated the mine, stated that the Klein mine, a shaft mine, has been producing about 1800 tons of coal daily, and was the only mine owned by the railroad in the state.

## A Ghost Town Again

Bradley Mining Co. has been forced by poor marketing conditions to shut down mine, mill and smelter at Stibnite, Idaho, "antimony mining capital of America." Thus Stibnite once again becomes a ghost town, reminiscent of so many other ghost communities once buzzing mining places of the West. The shut-down is to be completed August 15, when the smelter, as the final unit, will cease operations and the population drifts away. Since 1932, when Bradley established the mine, Stibnite has risen from a ghost gold camp to become the nation's principal source and productive center for antimony (90 percent of U. S. production), only to have its fortunes wane again and revert to its previous ghostly condition.

## Awarded A. E. C. Contract

The University of Nevada has been awarded a $60,000 contract by the U. S. Atomic Energy Commission for development studies of methods of processing uranium ores and concentrates. The contract became effective on July 1. The university will study beneficiation of low-grade uranium ores and extractive metallurgy for the recovery of uranium and other values from ores and concentrates.

Studies will be conducted on a laboratory and unit process scale. The work will not involve the construction of new facilities at the university.

## Resume Nine Mile Operation

Silver Star Mines, Inc., has resumed operations at its property on Nine Mile Gulch and its westerly tributaries north of Wallace, Idaho. The company owns and controls a large block of mining ground lying just north of the Osburn fault.

## Make Record Loan

The Government is lending $94,000,000—the largest defense loan made in the present emergency—to the San Manuel Copper Corp. of Arizona. The money will be used to expand the production of copper and molybdenum, both of which are needed in the defense effort.

San Manuel, a subsidiary of Magma Copper Co., located in Pinal County, Ariz., had asked for a loan of $111,288,000. Private funds are being obtained to cover the difference.

## Mechanize at Willow Valley

Willow Valley Mines Co. has installed an electric locomotive in the main 3000-ft tunnel of the Willow Valley group of gold mines near Nevada City, Calif., where the St. Louis vein was located last year. The extension of the Omega ledge, discovered later at a depth of 300 ft, is expected by the management to develop into an orebody of major importance. The company acquired the Bellfountaine, LeCompton, Independent, Posey, St. Louis and a number of other properties in the Willow Valley district early in 1950.

The Bellfountaine shaft has been


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rehabilitated and equipped, old workings reopened in some other mines, and a ledge of ore was found late in 1951 in virgin country 3000 ft from the portal of the Jackson tunnel in the St. Louis mine. Another vein was discovered recently in the company's Omega Extension property.

## Attract Agate Collectors

Prineville Mineral Society of Prineville, Ore., has launched a novel project in the mining world by opening a mining claim to allow collectors to seek agates and the agate-holding thundereggs, common in some of the areas near the town.

## Fire Fighting Contracts Let

Contracts for controlling coal mine fires at Elk Creek, 40 miles south of Gillette, Wyo., have been given to Doyle H. Moore and Leon White, the U. S. Bureau of Mines has announced at Denver. Doyle has contracted for an estimated 750 ft of drilling and 40 hours of bulldozing. White's work will include compact filling and approximately 80 hours of bulldozing.

## Air Rescue Mission

A U. S. Coast Guard helicopter rescued a Canadian geologist this July as he lay injured on a mountainside doing geological survey work for British Columbia, Canada. The helicopter flew out of Port Angeles, Wash., to effect the rescue as a courageous nursing sister was parachuted to the injured man in the wilderness. The 30-year-old geological surveyor lay injured for some 52 hours in the savage Pitt Lake region before the rescue Coast Guard helicopter party arrived. The nursing sister, one of three persons parachuting from the 'copter, had her 'chute caught in a tree and hung for three hours about 100 ft from the ground. Miss Grace Woodman, the nursing sister, finally freed herself from her tall perch in the high branches, while Dr. Dick Wynn and Sgt. Red Jamieson, also parachuting down from the U. S. Coast Guard 'copter, went to the injured man. The 'copter had been piloted by Lt. Comdr. William C. Morrill and Lt. Andrew Christensen, when the Royal Canadian Air Force asked the U. S. Coast Guard to effect the rescue. It had landed a half mile from the emergency camp, and it took Wynn and Jamieson four hours to carry the injured geologist to the waiting 'copter. Ken Northcote and Joe Chamberlain were the two Canadians working on Mt. Coquitiam for the British Columbia Geological Survey when the former missed his footing and in a twinkling went down the sheer declivity, receiving a painful back injury, being helpless until rescued at the 2800-ft level of the mountain.


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## Donner Mine Grows

The Donner copper mine, discovered in October, 1950, in the Campo Seco district of California, is being developed into an important producer. Mining is conducted through a new two-compartment 100-ft shaft, and the Mountain King mill has been leased for treatment of ore.

Located near the Penn mine in one of California's oldest copper fields, the Donner orebody was found in a section overlooked more than 80 years ago. The Mountain King mill was operated on ore from the Keystone mine at Copperopolis during World War II.

## USBM Station for Nevada U.

The Bureau of Mines stated recently that it will advertise for the construction contract on the new experiment station at the University of Nevada some time around October 1.

Contracts for preliminary planning for the station were awarded last May and received by the Bureau on June 27th. At the present time they are under Bureau review. Bids will be opened on or about October 31 and the award will be made in November. Bureau officials estimate that the building will be constructed within one year after the contract is awarded.

## Experts Judge

**The Winton, Wyo., Girl Scout team treating a patient in a First-Aid problem are watched intently by: left to right, Judge Dan F. McElhatten; Tom Allen, Colorado State Mine Inspector; J. J. Forbes, U. S. Bureau of Mines Director; and I. N. Bayless, President of Union Pacific Coal Co. The team is competing in a contest sponsored annually by U. P. Coal Co. in the Rock Springs, Wyo., area.**

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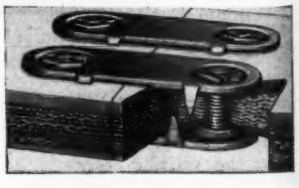

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## Complete Drift

At the Boston-Arizona mine, east of Skull Valley, Ariz., a 90-ft winze has been completed from the north drift on the 100-ft level. Drifts are now being run from the bottom of the winze and the adit is being advanced.

The Boston-Arizona was acquired late in 1951 by McFarland and Hullinger of Tooele, Utah. They propose to do sufficient exploration to prove the production possibilities of the property. John M. Johnson is mine superintendent.

## Chromite from Alaska

Chromite mining has been resumed on claims now owned by Mike E. Siler at Red Mountain, near Seldovia, Alaska. The mine produced some chromite during World War II.

## New Uranium Ore Buying Station

Anaconda Copper Mining Co. has opened an ore buying station near Grants, N. M. for the purpose of purchasing various types of uranium-bearing ores. The depot will be the first in the Grants area, and will also be the first of the uranium ore buying stations in the Colorado Plateau area to purchase limestone gangue type ores found in the Grants area. Sandstone type ores will also be purchased. Uranium ores will be accepted at the new station in accordance with the terms of the AEC's Domestic Uranium Program Circular 5, Revised, except that no payment will be made for vanadium in the case of the limestone type ore and no limit is placed on the lime content. Other types of ores may be purchased under special contracts with individual producers depending upon the metallurgical characteristics of the ores. It is expected that the new depot will stimulate the development and production of uranium-bearing ores in the Grants area.

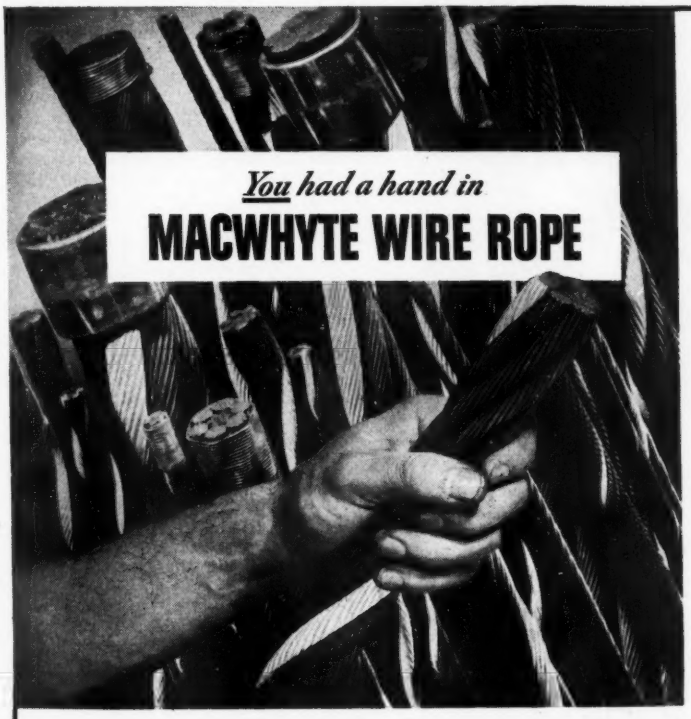
## Making Copper Shipments

The Pima Mining Co. has been shipping from one to two carloads of copper ore daily to El Paso smelter from its Alpha mine, south of Tucson, Ariz. A 425-ft, two-compartment shaft has been sunk and levels established at 300 and 400 ft.

Development of the property was started January 1, 1952, following geophysical work and a drilling project carried out during 1951. The mine is equipped with a surface plant consisting of a 100-hp, double-drum hoist, 600-cu-ft compressor, steel headframe, shop and other necessary buildings.

Plans call for complete development of the ore body, at which time a decision will be reached as to whether to erect milling facilities or to continue to ship commercial grade ore to the smelter.

E. D. Spaulding is the engineer in charge of the work.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## Wheels of Government

(*Continued from page* 122)

wage agreements. Negotiations are currently under way between the union and officials of the associations representing the coal operators. At this writing no announcements have been made as to the new terms being sought by the union.

Meanwhile, the Progressive Mine Workers' Union has formally told the Coal Producers' Association of Illinois that it will terminate its contract in late September. Reports hold that the Progressive Mine Workers are seeking a 15 percent wage increase and a boost in welfare contributions from the present 30-cent rate to 50 cents per ton.

### Zinc Duty Reimposed

On July 24 the import duties on zinc were restored, following a proclamation by President Truman revoking the suspension of the duties on zinc in ores and concentrates and on zinc metal. Prior to this, the United States Tariff Commission had reported to the President, as required by the suspension law, that the average market price of slab zinc for the calendar month of June, 1952, was below 18 cents a pound. Under the terms of the law, the President was required to restore the import duties shortly after he had received the Tariff Commission report.

Restoration of these import duties does not apply to zinc scrap which remains duty-free under a law enacted by Congress late last session.

### Renegotiation Exemptions

On August 7, the Renegotiation Board added 17 mineral raw materials to the list of those exempted from renegotiation under provisions of the Renegotiation Act of 1951.

The major item added to the exempt list was natural and portland cement, which had been the subject of lengthy study by the Board and of numerous representations on behalf of the industry. Other materials added to the exempt list are: natural tar, liquated antimony, metallic cadmium, sodium (produced directly by electrolysis of salt brine), unrefined copper anodes, germanium chloride and germanium oxide, iron pyrites (ores and concentrates), lime (including quicklime), metallic manganese, film mica, rare earth minerals, dimension stone, lump talc, metallic titanium, metallic zirconium, and nickel metal powder.

## Samplers Win Butte Contest

**Members of the winning team, the Samplers, are: left to right, sitting, Ted Rodlin, Albert Pogreba, George St. George and John Regan, captain; standing, A. C. Bigley, manager of mines, Butte Operations, Anaconda Copper Mining Co., William Steyh, team coach, Sheldon Davis, Richard Pratt and P. K. Ramsey, chief sampler and head of the Sampling Department.**

The team representing the Sampling Department of the Anaconda Copper Mining Co. won first place in the 33rd annual first-aid contest held in Butte, Mont., on Miners Union Day. The contest, in which 15 crack teams from the various ACM mines and departments participated, was the competitive highlight of the Miners Union Day program at the new Butte Civic Center.

The Samplers chalked up a cumulative score of 2485 on the five problems worked for a winning percentage of 99.40. Second place honors went to the Anselmo mine No. 1 team with an cumulative score of 2479 for a percentage of 99.16, and third honors went to the Leonard mine team with 2478 points for a percentage of 99.12.

Members of the first place team received medals in addition to a cash award given by the Anaconda Copper Mining Co.

## Safety at Homestake

(*Continued from page* 103)

sure future payments. Retired employes also continue to receive the benefits of hospital service.

### Management's Role

It is of the utmost importance that management take a direct interest in fostering the highest safety standards. This includes personal contacts with employes on the job, staff conferences, participation in safety meetings, with an acute awareness at all times of the importance of accident prevention. The entire organization should intuitively feel that the problems of accident prevention are of primary concern to everyone on the job. Unless there is sincere and conscientious interest on the part of management, effective accident prevention work cannot be expected from anyone, whether supervisor or workman.

Department heads and their staff are in daily contact with their men and must imbue those under them with the importance of safety. Theirs is the role of the mentor to instruct, to advise, to encourage and, when need arises, to discipline. The shift boss spends all of his working hours with the men and in their eyes he is the COMPANY, he is management. With him lies the grave responsibility of imparting to the men the thought that carelessness never pays, that safety should always come first, for safety spells cooperation between officials, bosses, and men. A careful workman is a good workman. An efficient workman is generally a safe workman.

### Conclusion

There is no open sesame, no secret formula in safety. Man made and natural hazards will be always present. Eternal vigilance by the entire organization is the only answer. Top quality supervision must ever be exercised. Contributory causes should never be shrugged off, there must be no "passing of the buck" to the injured man when the cause is more profound. Continuous repetition of caution and instruction is essential.

In Hoover's translation of Agricola's De Re Metallica, book II, paragraph 2, it states that

> "It is decreed by Divine Providence that those who know what they ought to do and then take care to do it properly, for the most part meet with good fortune in all they undertake; on the other hand, misfortune overtakes the indolent and those who are careless in their work."

What was true those many centuries ago is just as true today. Can a better policy be so briefly expressed for effective safety work.

# Manufacturers Forum

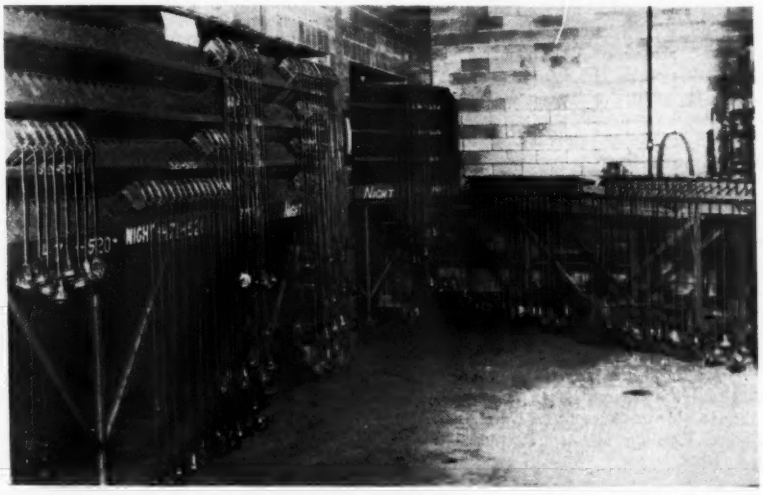
## Celebrate 75th Birthday

The Jeffrey Manufacturing Co., Columbus, Ohio, commemorated its 75th anniversary with an open house on June 21st for employes, their families and guests. Approximately 10,000 visitors were on hand to take the outlined tours through both the offices and shops.

Three main entrances were established to provide for the large crowd. Appropriate signs and banners were installed to welcome all who attended. Each lady received a rose, cigars were handed to the men and there were balloons for the children. They also saw in operation many machine tools, so essential to a big manufacturing plant.

## Efficient Lamphouse

Physical design and operating procedures of a new lamphouse at the Mather Mine "B" Shaft of Negaunee Mine Co., in Negaunee, Mich., include



all of the basic elements for efficient maintenance and distribution of miners' cap lamps.

Management of the mine planned the new system to provide: (1) speedy and easy distribution and return of lamps; (2) positive control of distribution, charging and maintenance; (3) maximum utilization of available space; and (4) functional efficiency.

An outstanding feature of the new operation is the use of reversible "self-service" racks for daily distribution of the new Edison R-4 electric cap lamps, which were supplied to the firm by Mine Safety Appliances Co. At "B" Shaft, a total of 544 of the R-4 lamps have been placed in service.

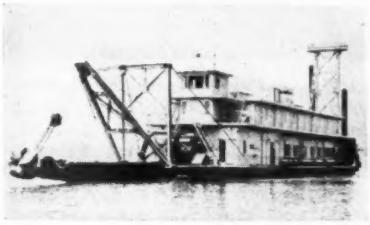
The unique racks are built on center pivots in one wall of a corridor between the changehouse and the shaft. On the opposite side of the wall is the lamproom. This arrangement enables lamproom attendants to insert charged lamps in slots on one side of the racks and then swing the entire panel around to face the corridor where miners quickly and easily can remove their individual lamps. There are three separate reversible racks. Total capacity is 696 lamps.

This type of lamp distribution, the management said, has increased substantially the speed with which miners can pick up or leave their lamps, a feature that is beneficial to miners and management alike. There is no chance, moreover, of an unrecharged lamp getting back into service.

When the distribution racks are swung around to face the lamproom, the attendant merely removes the lamps from that shift and loads them on a specially designed dolly which then is wheeled to the Edison R-4 charging racks. Each lamp is carefully inspected before it is placed in the charging rack.

## Complete Large Dredge

One of the most modern hydraulic pipeline dredges afloat was turned over to the Republic of Indonesia recently by Ellicott Machine Corp., Baltimore, Md., dredge designers and builders. The new dredge, named the "Musi," boasts a rated output of 650 cu yd of solid material per hour at a maximum dredging depth of 39.4 ft below water. The Musi's first assignment has to do with the current harbor improvement project being carried out by the Government of Indonesia.



One of the most outstanding characteristics of the dredge is that it is equipped for 24-hr operation. A crew of 32 men, representing three shifts, can be accommodated easily for an indefinite period. Complete living quarters, including a modern galley, two mess halls, refrigerating equipment and a recreation room help provide for such continuous operation.

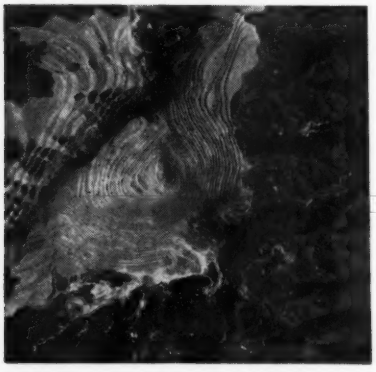
## Improve BX Cable

A new improvement in BX armored cable has been announced by General Electric's Construction Materials Division. Sizes 14 to 10 Awg of this cable will now utilize a glass braid instead of the customary cotton one. The glass braid, which is inorganic, will not rot and is flameproof. Most important, glass braid makes possible a smaller over-all diameter of the cable. Reduction of the size of the steel armor also gives a corresponding reduction in weight which makes the cable easier to handle and carry. The smaller size also means easier pulling through drill holes and improved resistance to impact and crushing.

The new cable fits all standard fittings and is listed by the Underwriter's Laboratories, Inc.

## Using Government Aerial Photography

The mining industry, at negligible cost, can utilize valuable aerial photography covering almost all U. S. areas. Prints are available under changing security and other regulations. Ten Federal agencies and some states have expertly photographed the country from the air for a wide variety of purposes. Each agency operates separately from the others and has its own regulations, negative files, and



widely separated offices. New photographs are constantly being added. Some are better than others for exploration, surveys, planning, etc. Valuable maps, aeromagnetic data, etc. are also available. Information on government aerial photography is given without charge by the Geological Survey, Washington, D. C.

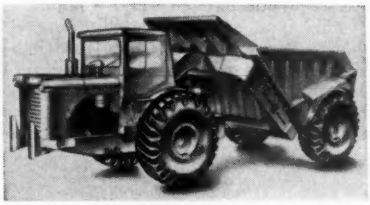
However, government officials concerned with custody and use of the aerial negatives welcome the personalized research and procurement work of the Washington Commercial Co., a business research firm at 1200 Fifteenth St., N. W., Washington 5, D. C. They believe its work valuable to users of such photography as well as helpful to the government. Required by law to operate separately, the agencies have to refer letters of inquiry to each other. Thus, procurement of the most desirable and up-to-date photography for a special purpose is often a hard, time-consuming job. While prints are made at low cost, the usual requirement of exact prepayment causes correspondence delays. Pressure of their regular official work usually prevents the agencies from rendering detailed, specialized assistance in supplying photographic prints. Nor, can they perform a coordinated procurement job for a user since, by law, they are not organized for such service.

The coordinated research work of the Washington Commercial Co. is performed at quoted fees for a specific job, the user paying the regular government print prices. Large engineering firms constantly using government aerial photography commend this research work which often can save large sums by locating photography and maps believed unavailable; by assisting clients in complying with changing security and other regulations; and by eliminating weeks of delay in print procurement.

## Add Motor Wagon

The TR200 Motor Wagon, a hydraulically operated rear dump wagon, has been added to the LaPlant-Choate line of earthmoving equipment, according to an announcement made recently by John W. Schoen, vice-president and sales manager for LaPlant-Choate.

The T200 two-wheeled, rubber tired tractor that powers the wagon is the same tractor used with the TS200 Motor Scraper. It is available with a choice of diesel engines. One is a



Cummins with 165 hp, and the other a Buda with 176 hp. Both are six cylinder engines. Scraper and wagon units are interchangeable. Each uses the same hydraulic system.

One of the outstanding features of this new unit is the stable wheel base. Four wheel air brakes make it possible to back the unit over the edge of a fill with complete safety. The unit is equipped with 21.00 x 25.24 ply Rock Lug tires. Top speed is 22 mph at a governed engine speed of 1800 rpm.

Additional information on the TR-200 can be obtained from the LaPlant-Choate Manufacturing Co., Inc. of Cedar Rapids, Iowa. Request form No. 1306.

## Aid To Zinc Refiners

Development of an improved stripping device for aiding the removal of electrically deposited zinc from cathodes was revealed recently.

In a large electrolytic refining plant, zinc is deposited by direct current on aluminum cathodes which are suspended vertically between lead anodes in a solution of zinc sulfate. Every 24 hours these aluminum cathodes are gang-lifted by overhead electric hoists from the electrolytic cells to stripping racks where the zinc deposits are stripped from the aluminum cathodes and sent to zinc melting furnaces to be cast in marketable shapes.

To facilitate the stripping of the zinc deposits from the aluminum

cathodes, it had been the practice to fit a grooved wooden stick on each vertical edge of the cathode. This separation of the zinc deposit along each vertical edge permits easy removal of the zinc from the aluminum.

However, wood broke easily, and was attacked by acids and subjects to swelling and distortion.

In order to improve the stripping operation, engineers designed a channel shape with special projections which was extruded in Aeroflex (polyethylene) by Anchor Plastics Co., Inc., New York, N. Y., to specifications.

Although costing several times as much as did wood, Aeroflex strips have proven economical due to their long service life and easy stripability. These plastic strips have now completely replaced wood in this application.


Established 1902
HOFFMAN BROS DRILLING CO.
CONTRACTORS
DIAMOND CORE DRILLING
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Our specialty—Testing bituminous coal lands
Satisfactory cores guaranteed

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ANYWHERE
"We look into the earth"
PENNSYLVANIA
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## Introduce New Side Dumps

A new line of side dump truck bodies for heavy duty applications is announced by The Galion Allsteel Body Co., Galion, Ohio.

Known by the descriptive name "Roll-Over," these are available in a wide variety of sizes and capacities.

Entirely mechanical in operation, Galion Roll-Overs dump to either right or left side, as desired. Bodies are 10-gauge steel, can be mounted on all standard trailers, and will withstand the most severe service. The self-contained subframe consists of three heavy box type outrigger cross members. Front and rear outriggers are built with a series of gear-like teeth which roll inside the formed channel tracks welded to the body. This construction locks the body in a stationary position and prevents forward or backward movement of the body on the subframe.

Main locking mechanism is a down-pull spring-loaded type plunger pin which engages in a socket built into an angle welded to the head of the body. Lock pin is actuated by a lever mounted to an A-type frame welded to the front of the subframe. Lever can be operated from either side of body.

To effect dump operation, driver disengages the spring lock chain on the opposite side of the body to which load is to discharge, then releases plunger lock lever. Bodies can be righted manually or by a slight shaking movement of the truck.

In addition to their single unit use, Roll-Overs can be employed in "trains" by installing one or two bodies on a trailer, and a third or fourth on an attached dolly trailer. With the "train" system, more than 50 cu yd of material can be handled with one tractor.

## Complete Compressor Line

Ingersoll-Rand rounds out its line of GYRO-FLO portable compressors with three sizes in addition to its 600 cfm model. The introduction of 315, 210, and 105 cfm units makes the advantages of the rotary sliding-vane design available for a wide range of operating requirements. Major benefits claimed by the manufacturer are simplicity and low cost of operation and maintenance, and greater reliability. Smaller dimensions, greatly reduced weight, and discharge temperatures at least 100° lower than conventional portables are other important advantages.

The 600-cfm model is powered by a General Motors diesel engine. The 315 and 210 cfm sizes offer a choice of either GM diesels or Continental Red Seal gasoline engines. The 105 uses a Continental gasoline engine.

GYRO-FLO portables are easy to maneuver in the roughest terrain because they weigh up to 40 percent less than reciprocating machines of equal capacities.

For more information, write to Ingersoll-Rand Co., Dept. PC, 11 Broadway, New York 4, N. Y., or any of its branches.

## —*Announcements*—

**R. S. Stevenson** was recently elected executive vice-president of the **Allis-Chalmers Manufacturing Co.** Prior to his advancement, Stevenson was vice-president in charge of the tractor division.

**Robert C. Carruthers** has been appointed assistant sales manager, welding products, of American Manganese Steel Division, **American Brake Shoe Co.**

**George E. Stringfellow**, vice-president of **Thomas A. Edison, Inc.**, has been elected a member of the company's Board of Directors. In his new capacity, Stringfellow will also serve as a member of the executive committee.

**Farmers Engineering and Manufacturing Co.** has announced the appointment of **John M. Appel** as general manager.

**T. D. Davis**, as Western Branch Manager of the Crusher and Process Machinery Divisions, **Nordberg Manufacturing Co.**, will be in charge of the company's entire West Coast operation including the Northwest territory formerly under the jurisdiction of **G. E. "Gunnar" Jarpe.** Jarpe was recently transferred to Duluth, Minn., as District Manager of the North Central Territory.

**W. B. Montague** has been appointed director of Public Relations for the **Jeffrey Manufacturing Co.**

**Kennametal Inc.**, announces appointment of **Dan Reebel** as manager of advertising and public relations effective June 1, 1952. **Fred W. Pennington** continues as advertising manager of the Metal Working Division, and **Richard L. Farris** as advertising manager of the Mining Tool Division.

**Western Precipitation Corp.**, Los Angeles, won one of the top two honors in the Annual Putman Award recently. Based on excellence of complete advertising campaigns, this marked the first time that an organization west of the Mississippi placed so high.

## CATALOGS AND BULLETINS

POTHEADS & TERMINALS, *Anaconda Wire & Cable Co., 25 Broadway, New York 4.* A new catalog on Potheads & Terminals which comprises Section No. 13 of Anaconda's General Catalog.

The new catalog (No. C79-13) includes complete design data as well as information and instructions valuable for proper ordering and installing all types up to 46 kv. It features both outdoor and indoor types and popular designs for transformer and switchgear.

This new publication, as an individual catalog, or the General Catalog incorporating Section No. 13, is available by addressing a letter-head to E. F. Luna, sales promotion director, at the above address.

EXCAVATORS, *Gar Wood Industries, Inc., Wayne, Mich.* Three new Specification Booklets showing detailed information on the new Gar Wood ¾ yd, Models 75A and 75B Excavators and the 75BT Truck Crane have been announced by Gar Wood Industries, Inc. They illustrate the capacities, ranges and dimensions of the most convertible excavators made today. Additional information on power plants; the right angle drive, the most efficient method of power transmission; travel speeds and controls are contained in this manual to help contractors select the right unit for their job.

Copies of these new booklets can be obtained from Gar Wood Shovel Distributors, or write Customer Service; Gar Wood Industries, Inc., Wayne, Mich.

SELECTING THE PROPER LOCOMOTIVE, *Goodman Manufacturing Co., Halsted Street and 48th Place, Chicago 9, Ill.* Actually a short course in transportation, this bulletin is designed to aid the mine operator in selecting the right battery locomotive for a particular job. Copies may be had upon request from Goodman Mfg. Co.

ALLSPEED MOTOR DRIVES, *Worthington Corp., Harrison, N. J.* Drives of from ⅓ to 7½ hp are described in the 16-page bulletin. Described and pictured are both upright and horizontal drives of either closed or skeleton types. Sixteen pictures graphically portray the ease of belt change. Discussed are such problems as service, electric motors, torque, bases, adverse operating conditions, shaft variations and mounting.

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CORE DRILLING

CONTRACTORS

Testing Coal Properties a Specialty

Guaranteeing Satisfactory Coal Cores

Pre-grouting mine shafts

Large diameter holes for Drainage, Air-shafts and Escapeways

Inside Mine Drilling

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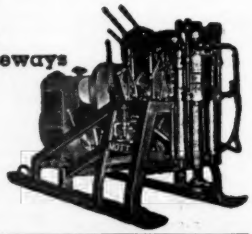
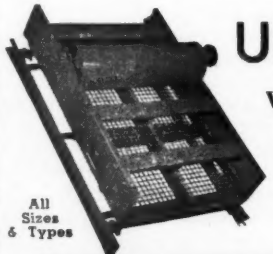
Huntington, W. Va.





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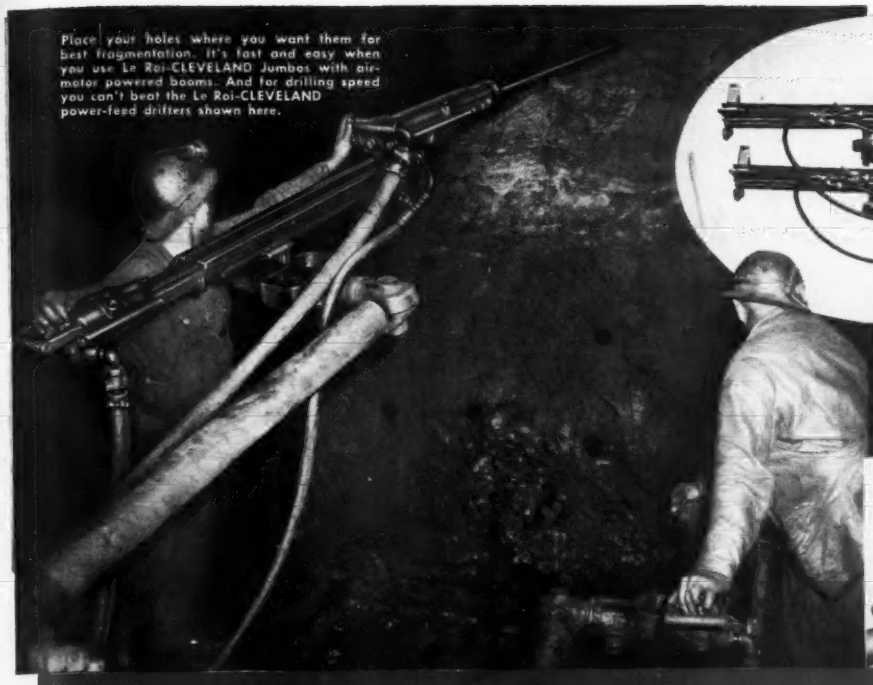
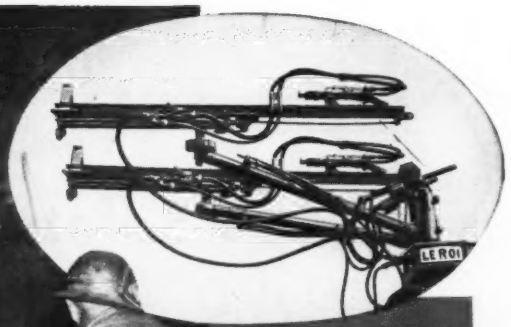
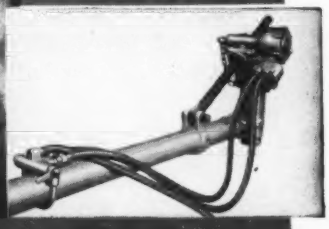

Place your holes where you want them for best fragmentation. It's fast and easy when you use Le Roi-CLEVELAND Jumbos with air-motor powered booms. And for drilling speed you can't beat the Le Roi-CLEVELAND power-feed drifters shown here.




Le Roi-CLEVELAND Jumbo equipped with long-feed drifters for use with carbide-insert bits.

Air-motor powered booms give fast, solid set-ups. It's mechanically impossible for booms to drift during the drilling operation.



# Drilling-Cycle Time Reduced, Footage per Shift Increased

## . . . when you use Le Roi-CLEVELAND Jumbos and power-feed drifters in your rock headings

THERE are three things you have to do if you want to save time in your drilling cycle and increase your footage — reduce set-up time, drill out the round faster, and shorten tear-down time.

You know this and so do we. That's why we designed the Le Roi-CLEVELAND jumbo the way it is. And that's also why our drifters drill so fast.

Let's see what you get when you use Le Roi-CLEVELAND:

★ The most flexible jumbo available. Air-motor powered booms let you space your holes quickly and easily for most efficient fragmentation.

★ Rigid, non-slip set-up feature keeps drifters in line, prevents steel binding, saves wear and tear on chucks, results in higher average drilling speeds.

★ Strong rotation, plus snappy yet powerful force of blow of Le Roi-CLEVELAND drifters gives you unexcelled drilling speed. This drilling speed coupled with the fast, positive feeding action of our power feed gives you the right pressure for fastest drilling and reduces drill-steel changing time.

You add all these advantages together when you use Le Roi-CLEVELAND jumbos and power-feed drifters. The outcome is faster drilling cycles, more footage per shift—so why not standardize on these cost-cutting honeys. Write for complete information.

LE ROI COMPANY

CLEVELAND ROCK DRILL DIVISION

12500 Berea Road, Cleveland 11, Ohio

*Plants:* Milwaukee, Cleveland and Greenwich, Ohio

RD-42

# Clearing the Air

## for greater Safety— increased Production—

# M·S·A

# RESPIRATORS

Protecting miners from dusts during operations such as drilling, cutting, and rock dusting is a big step forward in maintaining worker health, lowering accident frequency and increasing the production efficiency of the individual. The respirators featured here offer this vital safeguard and provide the wearing comfort that encourages full-time use.

### M·S·A "COMFO" RESPIRATOR

Features new mineral wool twin filters that pass air freely—effectively trap harmful dust particles. The higher dust collecting efficiency of the maze of extra-fine fibers is unaffected by atmospheric conditions. Increased vision, comfortable dust-tight seal, quick filter change. U.S. Bureau of Mines Approved. Bulletin No. CR-26.

### M·S·A DUSTFOE #55 RESPIRATOR

This compact, streamlined respirator offers the maximum in wearing comfort and protection. Users welcome its light weight (2¾ oz.) and low breathing resistance. They have found too that the soft sponge facepiece cushion conforms to facial contours without uncomfortable pressure. The nylon filter holder permits normal downward vision. New "Static-Web" filter assures maximum protection against dusts. Small number of basic parts simplifies cleaning and maintenance. U.S. Bureau of Mines Approved. Bulletin No. CM-14.

### M·S·A CHEMICAL CARTRIDGE RESPIRATOR

Equipped with a comfortable, gas-tight flexible rubber facepiece and twin replaceable, all metal cartridge filters, this compact respirator offers breathing protection against organic vapors such as acetone, gasoline, benzene and ether. Ideal protection in atmospheres where gases or vapors have a toxic effect after prolonged or repeated exposure. U. S. Bureau of Mines Approved.

MSA

SAFETY EQUIPMENT HEADQUARTERS

**When you have a safety problem, M.S.A. is at your service. Our job is to help you.**

## MINE SAFETY APPLIANCES COMPANY

**Braddock, Thomas and Meade Sts., Pittsburgh 8, Pa.**

*At your Service:* 66 Branch Offices in the United States

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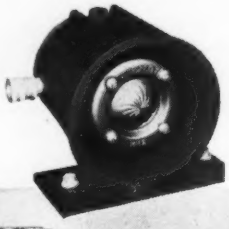

# *Answering Mechanization's Call for* FASTER, SAFER *haulage operations...*

## The M·S·A MinePhone Communications System

Maintaining the smooth, continuous transportation flow demanded by mechanized machines working at full capacity is one of the outstanding features of this modern two-way communication system.

Sending dispatcher's orders simultaneously to all motormen, who can reply or communicate with each other *while trips are in motion,* the M.S.A. MinePhone System makes possible those *extra* trips per shift that mean *extra* tonnage to you.

Because messages are transmitted instantly, on an "open-line" system which permits every motorman to hear all conversations, safety keeps pace with increased speed. Dispatcher and motormen are constantly in touch with all train movements, a feature that minimizes error, congestion and collision; track conditions, derailments, or roof falls can be reported immediately; time-consuming calls to each individual are eliminated, a vital advantage in emergencies. For complete details, write for Bulletin No. AU-3.

MSA

SAFETY EQUIPMENT HEADQUARTERS

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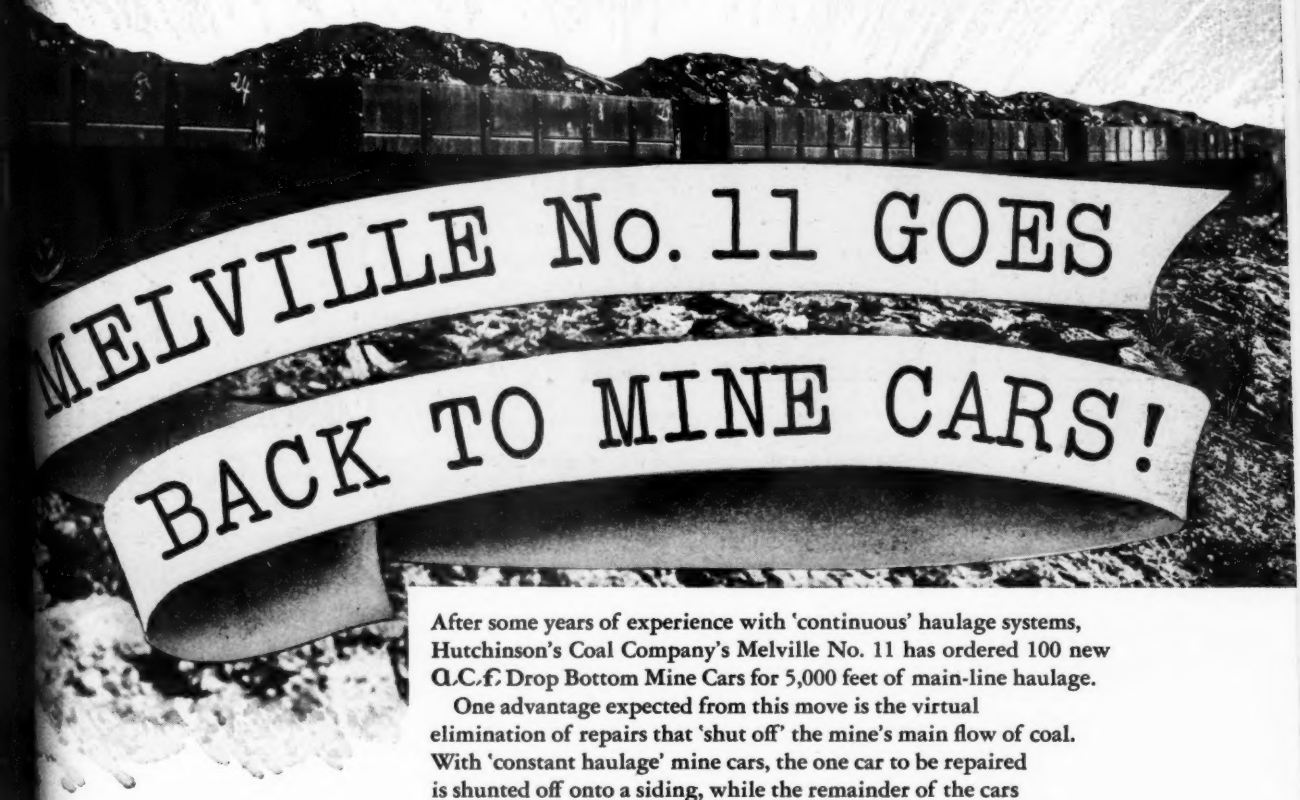
Cable Address: "Minsaf" Pittsburgh

# NO MINE CAN AFFORD TO LET REPAIRS HALT MAIN-LINE HAULAGE, SO...




After some years of experience with 'continuous' haulage systems, Hutchinson's Coal Company's Melville No. 11 has ordered 100 new A.C.F. Drop Bottom Mine Cars for 5,000 feet of main-line haulage.

One advantage expected from this move is the virtual elimination of repairs that 'shut off' the mine's main flow of coal. With 'constant haulage' mine cars, the one car to be repaired is shunted off onto a siding, while the remainder of the cars keep hauling coal. Delays are almost always counted in minutes, rather than in hours or days.

Hutchinson also expects Melville No. 11's new mine car system to provide safer, quicker transportation of men and materials, without the extra expense of a 'parallel' haulage system.

With the new four-ton cars, average dumping time for a 20-car trip is expected to be about 80 seconds. In many mines equipped with A.C.F. Drop Bottom Mine Cars, this speed saves enough time for each trip to make several *extra* round trips a day.

Your nearby A.C.F. Representative will help you analyze the advantages of constant haulage mine cars on your mine's main line.

American Car and Foundry Company, New York • Chicago
St. Louis • Cleveland • Washington • Philadelphia • San Francisco
Huntington, W. Va. • Berwick, Pa.

# a.C.f. MINE CARS

*for Constant Haulage*